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The Temple of Belus.

FROM the earliest days of the study of archæology, the great Temple of Belus, or Bel Merodach, the chief god of the Babylonian Pantheon, was a wonder of the world. The Greek travellers, historians, and geographers have written upon it, as have most modern travellers and explorers. But now, when the descriptions afforded us by the Babylonian scribes can be consulted, we may hope to gain a truer knowledge of this great national fane of the Babylonians. The temple was called the Temple of "Bit Saggal," or the "House of the exalted Summit," its name being derived from the great stage tower which formed its centre. It was restored by nearly every Babylonian and by a great number of Assyrian kings, and from these records we have been able to gather some interesting details regarding the edifice and the arrangement of its component parts. The principal inscriptions which have been consulted in order to gather the necessary details are, the tablet copied by Mr. Smith, and a notice of which was first published by him in 1876; this gives the measurements of the principal courts and edifices. Other inscriptions are the cylinders of Esarhaddon, Assurbanipal, kings of Assyria; and the India Museum inscription and cylinders of Nebuchadnezzar. From these, together with numerous small inscriptions and tablets, we have been able to gather the account of the main features of the building. The very faithful descriptions of the temple given by Herodotus have also been found of great aid, but those of Strabo and Diodorus must be rejected as fictions.

An inscription, of which unfortunately we possess only a copy made by the late George Smith, the original having been lost, furnishes us with a very large number of details and measurements of the great Babylonian temple. This temple was to Babylon what the great temple at Jerusalem was to that city, and, together with the royal palace, which was close adjacent to it, formed the acropolis of the city.

Herodotus, who visited Babylon when under the Persian rule, in the fifth century before the Christian era, has preserved a very accurate description of the main features of the great temple and the surrounding buildings, and his account meets with very great confirmation from the above inscription. We have in our former article dealing with the land laws and system of land survey in use in Babylonia,* given some account of the system of measures in use. But as the details of this work are expressed in a fuller scale of notation, it may lead to a better understanding of the matter if a short space is devoted to the explanation of the Babylonian numerical system.

A double or compound system of notation was in use among the mathematicians of Babylonia, being a fusion of the decimal and the sexigesimal, or a scale having for its units the numbers 10 and 60. The scale consisted of the following summations,—the unit 1, the sos or 60, the *ner* 60 × 10 = 600, and the sar or sarros = 60^2 = 3,600. With this series the Babylonian managed to carry out most extensive mathematical calculations.

In the measures employed we have the cubit, and the gar, with the uban or Babylonian inch, the table of these being as follows:—

60 uban = 1 cubit.
6 cubits = 1 kan, cane or reed.
12 cubits = 1 gar or double reed.

In the dimensions given in this inscription there occurs one, the ku, which is uncertain in value. We have, as it occurs only once, assumed it to be 20 cubits, but this is only an assumption.

Following the above system of mensuration and notation, the dimension given can be made out with considerable facility. The length of the Babylonian cubit is uncertain. Drs. Oppert and Lepsius, who have devoted considerable study to the ancient systems of mensuration, have arrived at different results, and so, in the following calculations, we have adopted as the length of the cubit, 20 in. English, which is possibly a little short of the real equivalent, but it will give fair approximate results.

Herodotus, who visited and inspected the temple and the edifices connected with it, gives a very full description of the temple accompanied by his own general measurements, and it is very important to notice that in his order of description he follows very closely that of the inscription, and it is therefore very possible that the Chaldæan priest who acted as his dragoman may have been familiar with the inscription which is now so valuable to us. Herodotus states that the temple area was a large square enclosure, two *stades* each way. Assuming the Greek stade to be equivalent to 600 English feet, this would give 1,200 ft. for each face, and about 4,800 ft., or 1,600 yards, as the total circuit, equal to about $\frac{1}{3}\frac{1}{3}$ of an English mile. The inscription commences by giving the measurements of the two great courts of the edifice. The first is called the grand court; the second the "court of the goddesses Istar and Zamama."

The Great Court was 11.33.20 in length; that is, following Babylonian notation, 11 × 3,600 by 33 × 60 + 20 uban = 41,600 uban or 693⅓ cubits = 1,156 English feet. The breadth was 9 × 3,600 = 32,400 uban, or 540 cubits = 900 English feet.

The dimensions of the Second Court were 10.33.20 uban = 38,000 = 633⅓ cubits = 1,056 feet English in length, and its breadth 4·30 uban = 16,200 uban = 270 cubits or 450 English feet.

We thus have as our dimensions of the two great courts of the temple,—

1. Great Court, cub. 693⅓ × 540 = feet 1,156 × 900.
2. Second ,, cub. 633⅓ × 270 = feet 1,056 × 450.

We can see from these dimensions the excellent proportion and system of these two great courts. The second was 60 cubits or 100 feet less in length than the large court, and just half its width.

In the relative position of these great courts it is clear that the lesser was not placed within the greater, but was an outer one admitting to it; and in this arrangement we are supported by the testimony of Herodotus as to the external measurements. If the court of Istar and Zamama was the outer one, giving access to the great

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* *Builder*, vol. xxxvi. (1878), p. 851.

one, and arranged as indicated in the accompanying plan, the total circumference of the whole block is nearly equivalent to that given by Herodotus. From north to south external measurement we have 1,350 English feet; from east to west, 1,156 English feet. The former is slightly in excess of the two stade, or 1,200 ft., given by Herodotus, as the side of the square; the latter a little under. The above is taking the longest court as the width from east to west, but if the width of the small court, and that at the entrance, which Herodotus was most likely to take, are adopted, we have a width of 1,056, and a total circuit of 4,812 English feet, or only 12 ft. in excess of the circumference of 8 stade, recorded by Herodotus. As there is some doubt as to the exact equivalent of the Greek stade in English feet, this agreement may possibly be even more close. However, it is a strong proof of the accuracy of the general and possibly only round number measurements given by Herodotus.

The inscription next records the gates which gave admittance into the temple. These were six in number, namely,—the "Great Gate."* This was probably the gate leading from the city into the outer court. This was the same gate as that called, in the cylinder inscription of the great builder, Nebuchadnezzar, the "Gate of Fertility, the Seat of Zirat-banit." It is sometimes called the "Gate of Zamama," from the court to which it gave entrance. Close adjacent to this gate, on the outside of the temple precincts, was one of the great marts of Babylon, for in contract tablets mention is often made of bargains being concluded "before the great Gate of Zamama."

The "Gate of the Rising Sun," or the East Gate,† opposite to which was the "Gate of the Canal."‡

There appear to have been three gates admitting from the outer court into the "grand, or inner court." The centre one was the "Grand Gate,"§ while on either side were the "Gates of the Colossi,"‖ or winged bulls, and the "Gate of the Tower View."¶ The arrangement of these gates on the plan is, of course, liable to alteration, but we may certainly claim for them that they are as accurate in arrangement as many of the proposed ground-plans of the Jewish temples. On entering the outer court, the first object was the "great sea" or tank, used for the purpose of purification, and corresponding to the "brazen sea" in the Jewish temple, and the fountain for washing in the courts of Mohammedan mosques. This was called the Ki Gal** or *birut*,—the pool, and its measurements* were 3 Ku square, or 60 cubits by 60 cubits = 100 ft. square. There were four entrances or gates on each side. There is no indication in the inscription of its position in the court, but it was probably placed so as to be convenient for a worshipper entering by any of the three outer gates, and so may conjecturally be placed near the centre. It was lined with stone, and supplied with water from the Euphrates by an underground conduit, traces of which exist. In the centre of the great inner court rose the ziggurat or stage tower, which gave to this temple its name of the "Temple of the Lofty Head." This great tower, of seven stages, was called the "foundation of heaven and earth." In the cylinder text just published, Nebuchadnezzar claims to have restored this vast pile. Herodotus thus describes the temple tower:—"In the middle of the precinct was a tower of solid masonry, a stade in height and a stade in breadth, upon which was raised a second tower, and on that a third, and so on up to eight."

The dimensions here given for the base of the great stage tower far exceed those of the inscription, and the only supposition for this discrepancy which we can adopt is, that since the time when the text was written, probably in the reign of Nabonidus, B.C. 555, large additions had been made at the base, or a platform introduced, which Herodotus takes as his base for the measurement.††

The base, according to the inscription, was 15 gar or 180 cubits square, with a height of 5½ gar or 66 cubits; that, in English measure, being 300 ft. square by 110 ft. high. It will be seen from this that the lower stage, according to Herodotus, is just double the dimensions as given by the Babylonian surveyor. In order that the measurements of this tower may be the better understood, the dimensions are arranged in order, thus:—

	Cubits.		English Feet.	
	Side.	Height.	Side.	Height.
Base	180	66	300	110
Second	156	36	260	60
Third	120	12	200	20
Fourth	102	12	170	20
Fifth	84	12	140	20
Sixth	66	12	110	20
Seventh	42 by 48	30	70 by 80	50*

From these dimensions it will be seen that the height was 300 ft., exactly equivalent to the side of the base, and therefore in true accord with the square canon of proportion so much used in the buildings in Babylonia. Following the analogy of the other great temple towers in Babylonia and Assyria, we are able to gain a very fair knowledge of the construction of this vast pile. There were temples of this character with tall ziggurati or stage towers in Babylonia at Borsippa (the Birs Nimroud), and Cutha (Tel Ibrahim), and at Ur (Mughier), as well as in Assyria at Assur (Kileh Shergat) and Calah (Nimroud), at Nineveh (Koyunjik), and at Dur Sarguia (Khorsabad). The Greek writers state that the seven stages of the temple towers were each of them coloured according to the divinity to which they were dedicated, and this statement meets with confirmation from the discoveries made in the excavations round the base of the great tower at Khorsabad. There were found there bricks covered with coatings of stucco and painted blue, black, red. The excavations made by Mr. Rassam at Babylon, and especially in the Amran mound, have brought to light a number of bricks covered with coatings of coloured plaster, showing that this mode of decoration was in vogue in Babylon, and we may therefore conclude that the stages were decorated with bricks according to the proper colours of the seven great gods. According to Sir Henry Rawlinson, who has devoted much study to this subject of the construction of the Temple of Belus, the colours were arranged thus, base black, second white, third purple or dark blue; fourth, light blue; fifth, red; sixth, silver; seventh, gold. The inscriptions show that the summit was covered with gold, as we shall see when we come to examine the accounts of the shrine Bel, which crowned the summit of this edifice. Considerable divergence of opinion has existed as to the construction of these great stage towers, and in some of the illustrations which used to adorn, rather than illustrate, pictorial Bibles and works on Biblical archæology, the restorations of the Tower of Belus were strange indeed. These great towers were solely intended for observatories, and were called "houses of observation." They were in all probability solid in the interior, being composed of brick casings filled in with earth, and may roughly be said to resemble seven solid proportionately-decreasing cubes placed one on top of another. In recording his restoration of the great seven-stage tower at Borsippa (Birs Nimroud), Nebuchadnezzar speaks of "the filling up the interior with earth and casing with brick." The great tower at Kileh Sherghat, the ancient Assur, which had fallen into decay, was restored by Rimmon-niari in the thirteenth century, and from the foundation record now in the British Museum we gain some details of the construction. The king says, "Its site I enclosed, its strengthening I accomplished, with stones and earth I made." If, therefore, the materials employed were only earth core and sun-dried bricks with an outer casing of kiln-burnt bricks, the decay of the edifice would be rapid and a great mound of *débris* would mark the place. Moreover, nearly all traces of plan would be obliterated.

Stone being almost entirely wanting in Babylonia,—it could only be obtained from a great distance, and at great expense, and, as the inscriptions show, was regarded as precious,—its use was far from general. The building material was exclusively of brick, either kiln-burnt or sun-dried, and the ever-recurring phrase in the royal specifications is "with bitumen and brick I made strong." The use of reeds as binders is mentioned by Herodotus, and proved by the extant remains to have been practised. This is noted by Mr. Rich in his memoir on the ruins. He states that he found "at the Mujelibe layers of reeds on the top of every layer of mud-cemented bricks." And impressions of reeds are often found in the bitumen adhering to the bricks.

There remains one other point to be noticed before passing to consider the great shrine which adorned the summit, namely, the means of ascent. In the inscriptions, the word rendered by some translators "staircase" is from a root meaning "to raise," "to exalt," "to ascend," and meaning rather "ascent," and we should consider, as we find it applied to ascents which must have been used for chariots such as the approach to the great gate of the palace at Nineveh, that the word rather applies to "inclines," gradual ascents, than to stepped stairs. The summit of the tower was probably reached by a series of such inclines, arranged as indicated on the plan.* To return now to the Greek historian, and his account of the great temple:—

"On the topmost tower there is a spacious temple, and inside the temple stands a couch of unusual size, richly adorned, with a golden table by its side." With this account of the temple we may compare the following extracts from inscriptions which record the beautification of the shrine. Assurbanipal, who had done so much to decorate Nineveh towards the end of his reign (B.C. 668-625), restored the shrines of Babylon, and especially that of Merodach, at Babylon.

"Bit-Saggal, the temple of the lord of the gods, Merodach, I made, I completed its† decorations. Bel and Bilit, the divinities of Babylon, and Hea (Oanes), the divine judge, from the midst of temple I brought.‡ I caused them to enter into Suanna.§ His holy place, fifty talents of gold .... with bricks I finished and enlarged. I caused to be made a ceiling‖ of cedar-wood, beautiful as the stars in heaven, adorned with beaten gold. Over Merodach rejoiced my heart. I worshipped and performed his will.

A noble chariot,¶ the carriage of Merodach, prince of the gods, with gold, silver, and precious stones, I finished its work. To Merodach, lord of the gods, king of the host of heaven and earth, the sweeper away of my enemies, I gave *a couch*;** of durable sycamore wood for the holy place, covered with precious stones, gold and silver, as the resting-place of Bel and Beltis, givers of favour, makers of friendship, skilfully I made."

Here we have a distinct mention of the couch as an important item in the furniture of the shrine some two centuries before.

According to another inscription, this couch was 9 cubits long and 4 cubits broad, or 15 ft. by 6 ft. 8 in.,—a size which fully justifies the expression of Herodotus, that the couch was of unusual size.

From the inscription now in the India Museum at South Kensington, which is full of details of the great works of building and restoration carried out by Nebuchadnezzar to the shrines, temples, palaces, and public works of Babylon, we may quote the following account of the restoration of this shrine in the early part of the sixth century, B.C.:—

"The shrine of the oracle of Bel of the gods, Merodach. Its gold-plated summit, like the daylight, shone; with marble and alabaster the interior I covered.

His holy shrine,†† the royal shrine, the shrine of his lordship the inspector of the gods, the Prince Merodach,

Which a former prince with silver had worked its work. With bright gold of surpassing splendour I caused it to be plated,

To the summit, the crowning point, with great beams, which from the mountains of Labnana,‡‡ lordly wood which they had brought,

For the ceiling of the shrine of the oracle of his lordship.

Even to the floor, the walls, the great beams, to the ceiling of the shrine, with bright gold I covered.

On the face of the beams and the ceiling with gold and precious stones I adorned."

On reading such a description of royal and lavish decoration of the shrine of the lord his god, the similar passages in the Hebrew books of Kings and Chronicles descriptive of the

* Marked A on plan. † C on plan. ‡ B on plan. § D on plan. ‖ E on plan. ¶ F on plan. ** G on plan.

†† This platform is indicated on plan as a square of 600 ft., or one stade.

* Shrine of Merodach.

* See plan and elevation.

† The work was commenced by Esarhaddon.

‡ They had been removed during restorations.

§ The holy quarter of Babylon.

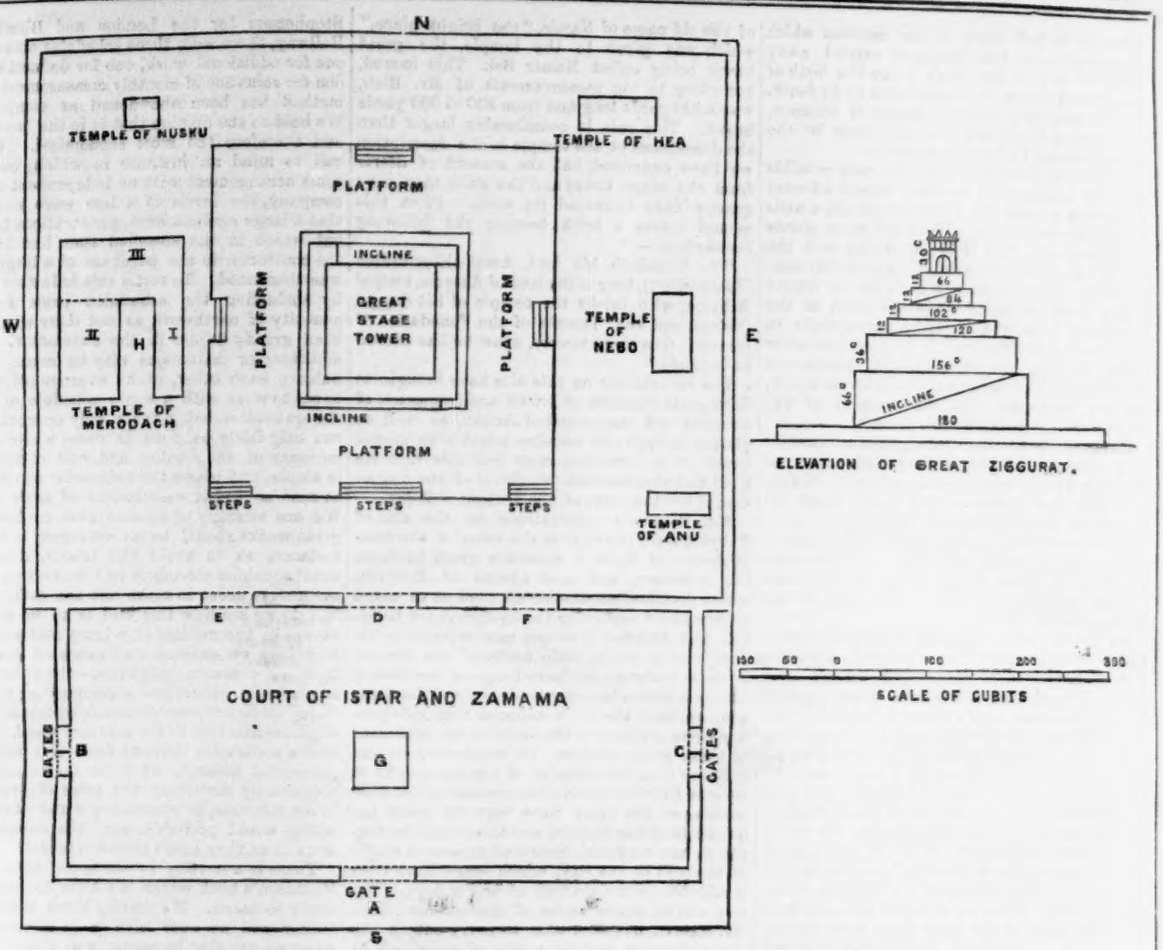
‖ "Overshadower."

¶ Often represented on the seals and engraved gems.

** Wood of reclining. Also rendered in some inscriptions "bed."

†† The word here is "parrakku," which is very closely akin to the Hebrew *paroketh*, "the veil of the temple." The word is also used as a synonym of *karim*, "the sacred impenetralia."

‡‡ Lebanon.



TEMPLE OF BELUS AT BABYLON.—*Plan Restored from data furnished by the inscriptions.*

building of the great temple of Jerusalem are at once called to mind. "The shrine of the oracle," so lavishly decorated by Nebuchadnezzar, corresponded in the Babylonian temple exactly to the oracle (*debor*) in the Temple of Solomon, which was a cube of 20 cubits, and was overlaid with pure gold, as were all the fittings and the posts of the screen and the altar, &c. (1 Kings vi. 20, 30). There is no mention in any of the inscriptions of any statue of Merodach in this shrine, but in the temple, at the west side of the inner court, there was a seated figure of the great Babylonian deity. Herodotus states "that below, in the same precinct, there is a second temple in which is a sitting figure of Jupiter all of gold. Before the figure stands a large golden table, and the throne whereon it sits, and the base on which the throne is placed, are likewise of gold."

The temple thus described by the Greek historian is evidently to be identified with the large group of sacred edifices in the inner court on the west side. These consisted of three blocks forming three sides of a square. The dimensions of these buildings were,—

Wing I. 100 cubits by 20 cubits = 166 ft. by 34 ft.
Wing II. 100 cubits by 65 cubits = 166 ft. by 108 ft.

The main block joining the two wings was 125 cubits by 30 cubit = 208 ft. by 50 ft.*

These temple buildings are evidently to be identified with those described in the India Museum Inscription (col. iv., line 7) as being restored by Nebuchadnezzar. "The temple of sacrificial victims, the high place of Bel of the gods, Merodach, the inspector of seasons and chief of the angels and spirits. In the holy places of Babylon with bitumen and bricks I made." A much fuller description is to be found in an inscription belonging to the early Babylonian empire, which was copied and possibly re-edited by Assurbanipal's orders. From this inscription † it appears that the temple was richly adorned with gold and silver, and that in it were statues, seated figures of Merodach and Ziratbanit, his consort. It is curious that Herodotus notes especially that the figure was seated, as this mode of representing deities was usually adopted by the Babylonians, as shown on the seals and gems. There is a curious passage in this inscription which may be quoted here:—

"For the shrines of Merodach and Ziratbanit a rich dress, a princely dress, dress of dark blue and gold spar I clothed them. With sets of robes their great divinities I had adorned; lofty-horned crowns, crowns of dominion, emblems of divinity, which were perfection, perfect I gave."

From this it is evident that the stone figures were clothed, and thus the rude stiffness which is so marked a feature in the statues which have been recovered, such as the Nebo figures in the Museum and the seated figures, would be hidden. This also calls to mind the passage in the "Iliad" of Homer, where the clothing of a statue is mentioned.*

It is evident that this block on the west side of the great quadrangle was the "sacrificial temple" of Merodach and his consort, and here were the images of the gods. It is this temple which the writer of that strange appendix to the Book of Daniel, the story of Bel and the Dragon, refers to.

There were several other temples within the great enclosure.

On the east side of the court was a temple dedicated to Nebo and Tasmit his wife. The dimensions of this temple were 80 cubits by 40 cubits = 133 ft. by 67 ft.

In the India Museum inscription we have the following description of the temple,—"The Temple of Nebo, the supreme intelligence of the gods. He who is the giver of the sceptre of justice for the ruling of all men. 'The Temple of the sceptre.' His temple in Babylon with bitumen and bricks I built, and worked its work."

This temple is to be distinguished from the great Temple of Nebo at Borsippa, which was a rival of the great Temple of Belus. The temples on the north side were two, one dedicated to Hea or Neptune, "the Oanes" or "teacher of wisdom." This temple was 85 cubits by 30 cubits = 142 ft. by 50 ft.; and adjacent to it was a temple dedicated to Nusku, "the messenger god," the Mercurius of the Babylonians. This temple was in dimensions 35 cubits square, or 85 ft. by 85 ft. Neither of these temples appears to have been repaired by Nebuchadnezzar. The Temple of Nusku was, however, restored by Assurbanipal, king of Assyria, who thus describes it:—"The dwelling of Sin and Nusku, which a former king, my predecessor, had built; from the beginning had been left, that dwelling had become old. The dwelling of Sin and Nusku its damages I repaired, beyond what was before I enlarged its site. From its foundation to its roof I restored it and finished it."

The doors were covered with silver and precious stones, and eagle-headed figures, the emblems of Nusku, guarded the doors. On the south side was the temple dedicated to Anu and Bel, and not Bel Merodach the Babylonian Belus or Jupiter, but the lesser Bel. The dimensions of this temple were 70 cubits by 30 cubits, or 117 ft. by 50 ft. There is no mention of this shrine in the inscriptions of the great builder-king Nebuchadnezzar, but in the copy of an early Babylonian text above referred to the restoration of the edifice is briefly recorded.

The Temple of Belus, the principal features of which are above described, may be said to be the heart of Babylonia. When all was well with the empire it was rich and prosperous; and pious and successful kings lavished treasure on its shrines. When the invader, the conspirator, and the rebel disturbed the land, then did sacrilegious hands seize on its gold and silver to bribe the aid of some potentate. But this temple is not only a pivot round which cycles of Babylonian history revolve, it is a land-mark in the history of Western Asia. The temple-tower or ziggurat of Belus raised its head above the surrounding plain when Abram set forth on his journey to distant Canaan. So, centuries

* See plan H.

† W.A.I. v. pl. 33.

* "Iliad," vi., 297-303.

after, it looked down on the captives which Nebuchadnezzar the conqueror carried away from the city of the Jews; it saw the birth of the Jewish nation, and was witness of its death. Built centuries before the temple of Solomon, its treasure-house was the receptacle for the vessels carried to Babylon as spoil.

With these facts before us, it is very possible that its construction in some degree afforded the Jews, a none too inventive people, a basis for the second temple. There are many points of agreement. The Holy of Holies and the shrine of Merodach exhibit very similar construction. The Great sea finds its equivalent in the *Birut* or tank,* while the court of the goddesses Istar and Zamama corresponds to the Court of the Women. It was in this outer court of the temple that the ceremonies described by Herodotus and the Hebrew writer, Baruch, connected with the worship of the Asiatic mother-goddess, took place.

It is hardly to be wondered at, when we consider how greatly Babylonia had influenced all Western Asia in religion and mythology, that it did with that influence also exert some influence on the religious architecture.

It is now time to pass to the consideration of the question which of the great mounds marking the sites of the ruins of the great edifices of Babylon covers the ruins of the Temple of Belus.

In dealing with this point, there are certain facts which must be borne in mind, and these are of considerable importance. First, that Rich, Rennel, and others who have written learned treatises on the ruins of Babylon, could not read the inscriptions, and were, therefore, only guided by the very second-hand information of Greek writers. Then, also, there must be remembered that for centuries Babylon has been the brickfield of the builders of the districts of Hillah and Baghdad. The houses, the courtyards, the fortifications of Hillah, and a great part of the works of Baghdad, are built with bricks which bear the name and titles of Nebuchadnezzar. When we consider this, we must see that many of the ruins have been greatly reduced by this constant carting away of bricks, and so do not represent so great an altitude as formerly, while *débris* is largely spread over the surface. It will be admitted that where a brick is found bearing an inscription referring to a definite edifice, the probabilities are that the spot where it is found is the site of that edifice. So we see that a slab found in one of the mounds of Babylon which bears an inscription reading the "palace of Nebuchadnezzar" should mark the site of the palace; while another bearing the "legend of the Temple of Bit Saggal" should mark the site of that temple.

Most writers have regarded the Babel mound situated at the northern extremity of the *enceinte* of Babylon as the site of the Temple of Belus. But the explorations carried out on the site by Mr. Rassam in 1878, which led to the discovery of a number of wells and extensive hydraulic apparatus of conduits, &c., would seem most strongly to show that this was the site of the new palace, and the precincts of which were the celebrated hanging gardens.

Passing south a mile, we come to the next great block of ruins, the Kasr or palace mound. Arab tradition marks this as the palace of the Babylonian kings,—the old palace,—and this meets with confirmation by a brick inscription which records the legend, "the palace of Nebuchadnezzar, king of Babylon." It is therefore most probable that this is the site of the palace of Nebuchadnezzar. This inscription reads,—

"The palace of Nebuchadnezzar, king of Babylon, restorer of Bit Saggal (Temple of Belus), Bit Zida (Temple of Nebo). In the service of Nebo and Merodach, his lords, he has gone forth. Son of Nabupalassar, king of Babylon."

This inscription differs somewhat from the usual stereotyped phrases of the brick legends, and clearly belongs to the palace; its being found in the Kasr mound would therefore seem to mark that spot as the ruins of the palace.

At the southern extremity of the *enceinte* of Babylon is a large mound usually called the Amran mound. It derives its name from an imaginary son of Ali, named Amran, whose pretended tomb is here. It is somewhat unfortunate for Moslem martyrology that Ali is proved to have had no such son. It is very possible that the Arabic Amran is an echo of the old name of Namir, "the bright place," which was given to the temple, the great tower being called Namir Bel. This mound, according to the measurements of Mr. Rich, was 1,100 yards long and from 800 to 900 yards broad. This ruin is considerably larger than the dimensions of the temple in the description we have examined, but the amount of *débris* from the stage tower and the walls may very greatly have increased its area. From this mound comes a brick bearing the following inscription:—

"To Merodach his lord, Assur-akhar-iddina (Esarhaddon), king of the land of Assyria, king of Babylon, with bricks the temple of Bit Saggal (Belus), and the 'Temple of the Foundation of Heaven' (the stage tower), anew he has caused to be made."

The excavations on this site have brought to light great numbers of bricks, and fragments of coloured and stucco-coated bricks, as well as plaster capitals and cornices inlaid with glazed tiles. It is, therefore, most probable that we shall find that beneath the *débris* of the Amran mound are the ruins of the Temple of Belus.

Mr. Rassam's explorations on the site of Babylon have shown that the ruins of the establishment of Egibi & Sons, the great bankers, tax collectors, and land agents of Babylon, whose inscribed documents afforded us so much information* regarding the topography of Babylon, was situated in a spot now marked by the Jumjuma mound, a little south of the Amran. In these contracts we have frequent mention of bargains concluded near to the gate of Zamama, and we may therefore suppose that this gate was close adjacent to the business establishment of these great traders. In conclusion, we can only say that the question of the topography of ancient Babylon is one that presents great difficulties, as the ruins have been for years the brickfield of the district, and this irregular excavation has, no doubt, destroyed numerous traces of the plan of the city, which would have been invaluable to the student of archæology. The long and extensive series of explorations which Mr. Rassam has been able to carry out on the site of Babylon, and the results of which will be made known to us on his return to England, will, no doubt, contribute much to the solution of the many problems connected with great Babylon.

* Perhaps the Birkat-Israel would be more appropriate.

* See *Builder*, vol. xxxvi. (1878), p. 852.

AN ENGINEERING AID-BOOK.†

THIS is the second part of a useful book. On the publication of the first volume we said (*Builder*, 27th of April, 1878) that its study might save much time, much money, and consequent heartache. In the present volume we find the results of much experience, and of much of that yet rarer qualification, common sense, made available to the inquirer in a systematic form. Taking, for example, Chapter xiv. (which is the first in the present volume), "On Contract and Purchase in the Building Trades," we should characterise it as a skeleton form of thought applicable to the subject,—a sort of mental algebra, by the use of which, substituting the true values for the algebraical values, the student can hardly fail to obtain a true answer.

There is, however, one part of this chapter which would fairly bear to be treated at much more considerable length. We refer to the subject (p. 30) of "Payment by Results accomplished." The author justly says that to the spirit and enterprise of contractors, who have taken upon themselves the risk of failure, the carrying out of many important works which would not otherwise have been attempted is due. We confess a leaning to the opinion that for large and important works the best method of arrangement is that of a lump contract for a definite sum, to be only increased or diminished by an increase or diminution of the work ordered by the engineer. It was upon this principle that the earliest contracts for railways were based, and we think that upon the whole, it has been found to work better for both parties, the company and the contractor, than any other method. In cases of contracts under foreign Governments abroad, we think that this mode, carefully advised upon, not only by an English lawyer but by a local lawyer, affords almost the only security for a contractor. In the earliest English contracts,—those, for instance, made to carry out the specifications of Mr. Robert Stephenson for the London and Birmingham Railway, there were three schedules attached,—one for additional work, one for deductions, and one for valuation of monthly measurements. This method has been abandoned as complicated. We hold to the opinion that it is the most fair, and therefore the most economical. We can call to mind an instance in which, owing to some arrangement with an independent railway company, the levels of a line were so altered that a large embankment, preparations to carry out which in the specified time had involved the contractor in the purchase of a large plant, was abandoned. To settle this deduction simply by deducting the scheduled price for that quantity of earthwork as *not done* would have been grossly unjust to the contractor. Slight additions or deductions may be made, if they balance each other, at an average price. But to set to work with a single schedule of prices, the quantities being taken only approximately, can only fairly be done in cases where the experience of the quality and cost of the work is ample, and where the contractor can be quite at ease as to his calculations of more or less. We are strongly of opinion that contracts for great works should be so arranged, in the first instance, as to avoid the labour, delay, and usual squabble attendant on "measuring up" at the end, in order to make out the contract bill. Nor do we see how this end is to be attained, except by the method of a lump contract, alterable only on ordered and executed deviations from the contract quantities,—the value of the additions or deductions corresponding to which should be directly ascertainable by fair schedules of prices attached to the contract itself. Whenever a contractor departs from this method of protecting himself, he must do so either by appreciably increasing the price of every item in his schedule, or by running a risk of disaster, which would probably cost the company far more than they could hope to recover.

There is a novelty in the typography of Mr. Matheson's book which we hope to see extensively followed. We hardly know whether the author will at once take it as a compliment when we say that he presents us with a reversal to the most ancient form of writing, the hieroglyphic; but so it is. Mr. Matheson has revived, after a disuse of more thousands of years there it is needful now to count, an expedient which puzzled the early students of hieroglyphics, until it was understood. In the Egyptian writing of the last 5,000 or 6,000 years it may have been a surplusage, but even there it has at times proved of singular value. We refer to the use of the ideographs or determinants. Thus, if we find the letters (hieroglyphic symbols) "d . o . g." in this kind of writing, they may be followed by a little sketch of a dog. We will not now enter on the question how far each written symbol of sound was originally ideographic, but will come at once to the use made by Mr. Matheson (no doubt with perfect unconsciousness) of this ancient method of explanation. One of the best points of the book, as far as the work of the printer is concerned, is the clear and good system of marginal indications of subject, which forms the basis of a good index at the end of the volume. The novelty in this is the introduction, also in the margin, of a little sketch of the subject of the section. Thus on p. 258, under the marginal head "Water Cranes," we find the sketch of a water-crane, and that of a water-tank with attached hose. The particular instance on which we have lighted is, however, defective in one respect. Neither "Tanks required," nor "Swinging Jib," which are in the margin, are to be found in the index. Nor is there any list of cuts, nor indication to the reader as to the page at which 133 and 134 are to be found. These additions are required in order to make the plan complete. But even as it is, the great aid afforded to any one who is turning over the pages of the book in search of any particular subject by these little marginal ideographs is very great. The cuts are generally good. They might, perhaps, be multiplied with advantage, and in the event of a new edition (which can only be a question of time), we suggest to Mr. Matheson the propriety of introducing a special index of these marginal illustrations, which need only contain the cuts themselves referred to the pages on which they are to be found. This would save the time of turning over the leaves, and may be developed into an aid to the reader, or more properly to the consulter, of volumes of this nature, of a value hard to exaggerate.

† Aid-book to Engineering Enterprise Abroad. By Ewing Matheson, M. Inst. C.E. London: Spon. 1881.

The chapter (xvii.) on "Transmission of Power," is one that has been written with much care and judgment. It brings down the "burning question" of the electric transmission of power fully to the date of publication, although the recent experience of the transmission of a charged Faure battery opens a new chapter in this vital part of mechanical science. The examples given (p. 100) of the transmission of power for as much as four miles in Sweden, by the use of wooden connecting-rods, and that of the transmission, by ropes, of 700 horse-power obtained from three turbines, at Zurich, especially command attention. This chapter presents a remarkable parallel (although, of course, involving much more detail) to the paper by Mr. Conder on the same subject in the new American periodical, "The Progress of Science," which has just been commenced at Boston, U.S. There is, however, one point in the latter paper which Mr. Matheson will do well to extract from that journal in his next edition. We refer to the proportion between the horse-power expended in the working of machinery, and in the net effect produced by that machinery. This is illustrated in a very exact manner by the accounts of the working of the wire rope on the Blackwall Railway, under the direction of Mr. Robert Stephenson.

It is remarkable that in a chapter so comprehensive as to include the subject of the transport of force, under the head "Transmission of Power," which is, perhaps, rather touching on another province, the author should have taken no notice of that method of transmitting power which is by far the most important of all. We refer, of course, to the locomotive engine. It is true that in the chapter on "Railway Equipment," as well as in a chapter on "Railways" in vol. i., the reader will have no difficulty in obtaining information as to the railway locomotive. But what should have been found with regard to it in chapter 17 is the investigation of how much motive power is consumed in working the locomotive, as compared to that consumed in the traction of the train. Had we space here to discuss the question, we should be able to show that a loss of something like 80 per cent. of the effect of the steam produced is incurred by its application through the medium of the locomotive propeller. This is a subject which ought to be freely discussed in dealing with the transmission of power.

The chapter on "Railway Equipment" is another instance of what we may call tabulated good sense; and is one of those which is best illustrated by the marginal cuts of which we have before spoken. Those of different forms of rails (pp. 239–241) are especially noteworthy as examples of how effective the graphic table of contents may be made. The sketch of the Barlow Rail calls attention to Mr. Matheson's comment, which hardly does justice to that ingenious invention. The chief objection to it hitherto has been the fact that it is only when the price of iron is abnormally low that it can compete, economically, with other modes of laying. It is also harder to run on than a sleeper line, probably requiring less engine power, but costing more in vehicle and locomotive repairs. At the present time a question would arise as to the feasibility of rolling an iron Barlow Rail with a steel top. If this can be satisfactorily effected, the value of the method for such cases as the Euphrates Valley line is of the first order. A railway can be more rapidly laid, we can say from a good deal of experience, of Barlow rails than of any other construction. When laid it presents a pair of solid continuous metallic bars, which are safer against any hostile meddling than any other form of rail. And, in addition to this, the rail will provide a perfect safeguard for the cable of the electric telegraph, if the isolation is thoroughly effected. Thus, for any case like the Candahar railway, or the great line which we yet hope to see laid on the right bank of the Euphrates, the advantages offered by the Barlow rail would be so great as to justify the engineer in making use of that system, even if somewhat more costly in the first instance than one involving wooden sleepers, subject as they are to attacks from insects, from decay, and from mischievous attempts at displacement. Any savage could pull to pieces a railway keyed into chairs that are bolted to sleepers. Very few would know how to commence operations against a riveted permanent way of Barlow rails.

If Mr. Matheson had not given us a good book, we should not have taken so much trouble to point out one or two improvements that may be made in the second edition. We can conscientiously recommend the volume to our readers.

ST. MARY OVERIE, SOUTHWARK.

ALL possible credit is due, on the part of those who are interested in the history of architectural monuments, to Mr. F. T. Dollman for the labours which he has bestowed in illustrating and commemorating the history of the most interesting and important church in London, next to the Abbey and the metropolitan cathedral. The folio volume* which he has published, in illustration of St. Mary Overie, may be said to have been a labour of love, and of very devoted love; for he tells us that he has been for fourteen years occupied in collecting the materials and making the drawings for it; and a publication of this kind of book is, commercially, a way of spending rather than a way of making money.

The book consists of a history of the church, including a good many curious details not bearing directly on its architectural history, but illustrating the manners and habits of various periods from documents connected with the church, as well as the varying attitude of mind towards architecture of the official bodies who ruled the church in post-Reformation times. The larger bulk of the volume is occupied by forty-four plates, photo-lithographed from the author's drawings, giving measured details of the portion of the ancient church still existing, the choir and retro-choir, and restored drawings of the original nave, which was pulled down in 1838, and replaced by the present gingerbread interior. As regards the manner of the drawings, they have been very carefully executed, and show a great amount of work. We have only two slight criticisms to make, which we do rather for the attention of those who may be moved to produce similar books of illustration. The one is, that some of the drawings are really rather spoiled by the shading and touching, which is somewhat too scratchy for our liking; for instance, the graining all over the woodwork in the elevation of the classical reredos (plate 31) is too coarse and scratchy-looking to improve the effect of the drawing, and, at the same time, it has consumed more mechanical labour than it was worth; and in some of the other drawings there is a good deal of surface-touching, on the masonry, &c., which would have been better omitted; it is not done with sufficient artistic feeling. High finish in surface touching and shading is no doubt an addition to architectural drawings, if it is done very finely and delicately; otherwise it is better omitted. In other respects the drawings are all that can be wished. The other small point we may mention is that the writing on some of the drawings might have been better and more neatly and legibly done. It is the fashion of draughtsmen nowadays to scribble the necessary notes and explanations on their drawings in a rather rough-and ready manner; this may pass in drawings which are only intended as passing illustrations in a journal (though we beg to intimate that we do not desire to have such scribbly drawings offered to ourselves), but in a book which is intended as a permanent and important contribution to architectural illustration, such as would find place in architectural libraries (as this one certainly should), we do like to see neatness and finish in all the details.

This is, however, only a minor point, and does not impair the essential value of the publication. The interest of the book, in an illustrative point of view, is increased by the fact that the author has had the advantage of making use of some of the drawings of portions of the old church, which no longer exists, made by the late Mr. Gwilt, at the time when he was engaged in repairing the choir. We thus have some authentic records of portions of the building which have now disappeared. The choir of St. Mary Overie still remains essentially as it was (internally, at least), a fine specimen of Early English work of very solid and dignified type; and with a vault which is a remarkably fine specimen of quadripartite vaulting, and affords a marked example also of that peculiar twist of the diagonal rib and its continuous vaulting surfaces, from the unequal transverse and longitudinal width of the bays, which Sir G. Scott called (not inappropriately) "ploughshare" vaulting. The nave of the church has gone through three epochs. Built in the same style and at the same date as the choir, the vault fell in in 1400, a result which has been supposed to have been partly due to the removal or weakening of the buttresses. It was reconstructed with a wooden vault of considerable elaboration of design. In 1831 this roof was removed, it also having become, or supposed to have become, dangerous from decay and dilapidation, and the service of the church temporarily transferred to the choir while the vestrymen and ratepayers quarrelled with each other as to what should be done with the nave, which, in the mean time, was left standing unroofed. Party-spirit ran very high at this time in the parish of St. Mary, of which Mr. Dollman gives some amusing examples in the republication of some of the circulars and posters issued by those who considered themselves concerned in favour of this or that scheme. The tone of these precious documents may be said to represent the most typical form of a vestryman's mind, and shows a marvellous degree of vulgarity and ignorance, and the reduction of every consideration in reference to the treatment of the fine old church to the most pure and unadulterated test of £. s. d. Eventually the nave was removed and the present specimen substituted, which, such was the incapacity of people at that time even to see correctly the architectural facts that were before their eyes, was believed to be in the most exact conformity with the style of the remaining portions of the original structure. That the choir was not removed and rebuilt in the same fashion was owing, not to any regard for the structure, but simply to the opinion of a majority of the ratepayers and vestry that it would be an unnecessary expenditure of money, against which the most vigorous protests were raised.

The style of the existing portions of the church is well known to all in London who take an interest in Mediæval architecture. Of the original nave, including its vault, Mr. Dollman gives a restored perspective view, and also a section and details of the later oak vaulting which superseded it. We have not been able, however, to find any precise statement as to the authority for these representations. The author states in his preface that he has shown nothing but what he has *bonâ fide* evidence for in the shape of sketches, drawings, or memoranda, nothing of mere conjecture or fancy of his own having been introduced; and he also states that through his introduction to the family of the late Mr. Gwilt, he was enabled to make use, as we have already mentioned, of a number of the drawings made by Gwilt at the time when he was architect for the repair of the choir. In one case, in the elevation of a Norman door which existed in the old nave, he appends a note that this drawing was made from an accurately measured sketch from the original doorway by C. E. Gwilt. We presume, therefore, that the details of the oak vault and of the general architectural design of the nave is also from sketches of Gwilt's, but we have not been able to find any statement as to the source from which this portion of the illustration is derived: it would have been better if this had been more explicitly stated. The drawings of the original stone vault which fell in 1400 must, after all, we presume, be entirely conjectural.

Among the most interesting sheets in the illustrations are some of the various small details, both of parts of the building and of various objects of furniture which had belonged to it. These are collected apparently from many sources, from drawings in different collections or publications, as well as from objects which still exist. Among the latter may be included a considerable number of the carved bosses of the oak roof of the nave, which are still preserved in the building. There are also some interesting sketches of bits of building contiguous to the church, now demolished; some of them very interesting examples of old, picturesque, unsanitary London. On one plate (10) we notice a couple of small sections showing the levels of the roadway and approaches of old London Bridge and the present bridge respectively, in relation to the church, showing how much the church has been put in a hole, on one side at least, by the raising of the level, in accordance with the usual tendency in towns, where the ground-level almost invariably rises as time goes on. With the slight drawbacks of execution which we have alluded to, Mr. Dollman has produced a most interesting and valuable

* The Priory of St. Mary Overie, Southwark, comprising (1) the history, (2) the description, (3) the illustrations, of the church and conventual buildings. By Francis T. Dollman, architect. London: W. Drewett, Southwark, and Dryden Press, Long Acre; and of the Author. 1881.

monograph of a very important building, and done thereby a great service to architects and archæologists.

THE LIVERPOOL LANDING-STAGE.

OUR readers may remember some time since the announcement of the unfortunate destruction by fire of the then new landing-stage in connexion with the pier on the Liverpool side of the Mersey. This large and fine floating pier was before long reconstructed, but the elements seem to be against it, and it is now under the influence of a new and serious danger from the alteration of the bed of the river. The landing-stage is moored parallel to the dock walls at a sufficient distance to float in water which shall be always deep enough for steamers to come alongside at all states of the tide; the want of depth at the old stone pier, the base of which is, in fact, dry at the lowest tides, having been the original *raison d'être* for the landing-stage. The latter, reached by bridges from the pier, thus forms the medium of communication for all the steamer traffic with the town, the regular service of ferry steamers to different parts of the Cheshire side occupying the south end of the stage, while luggage-boats and some of the smaller class of sea-going steamers make use of the rest of the length. About a quarter of a mile south of the end of the landing-stage there has long been, adjoining the Liverpool shore of the river, a shallow known as "Pluckington Bank," nearly dry at low tides, and which, though varying very much in its outline and conformation, has for some years remained pretty much in the same position. But during the last few months Pluckington Bank, for reasons which no one has discovered so far, has enviously and insidiously commenced moving northwards down the river towards the landing-stage, under about one-third of which there is now a formidable sand-bank, which seems to be slowly moving along. Any one now going down on to the landing-stage at low water may see a very curious sight. Looking southwards along the stage, he will see its whole floor twisted, the further end rising considerably, and the side next the dock walls also rising, the floor of the stage thus undergoing a kind of double twist. Part of the stage is aground, in fact, and the rest floating. The stage is carried on floating iron pontoons at right angles to its length, so that one end of a number of these is aground at low tide. What sort of effect this will have upon the plates and rivets of the pontoons may be easily imagined, and we should have expected to hear that some of them were hopelessly leaky before now. A great amount of inconvenience to traffic is also being caused from the insufficiency of water for the ferry steamers at low tide, so that at certain states of the tide they have all to leave their usual quarters and bring up at the other end of the stage, which is so long that the change of position may mean the missing of a boat by passengers who come down to the wrong end. This, however, is a minor matter compared with the serious damage to property which seems to be threatened, and the difficulty of applying any practical remedy.

The method which Mr. Lyster, the Liverpool Dock Board engineer, has recommended, and preparation for which is being made, is to construct sluices along the pier wall, and pour a large body of water from them over the bank, so as to create an artificial scour, and wash the sand away. We confess to being somewhat sceptical as to the efficacy of this expedient. What was very evident to us was that a great deal of money is being sunk in masonry in the construction of the sluices, and that more will have to be sunk before this method, if it does answer, can be effectual, as the bank has already extended considerably further since the construction of the sluices was commenced, and it will evidently be necessary to follow its course further; and we are disposed to think that the mass of sand which has been formed between the landing-stage and the pier is rather too formidable an obstacle to be dispersed by running water over it, at least by any such mass of water as can well be artificially sent over it. It is at present the will of the Mersey, with its strong tidal ebb and flow, to pile up sand here, and it seems very questionable whether the power of the river can be fought with by an artificial sluice. Moreover, the dock engineer does not talk of having his sluice ready for operation till October, and if a good autumn gale comes on before then, it may make short work with the north end of the stage, for the Mersey at Liverpool is really more an estuary than a river, and a gale from some quarters gets up so much of a swell that the stage would soon thump herself to pieces on the bank under such circumstances.

The municipal council, judging from the reports in the local papers, seem to take the matter rather easily, and to have faith in the result of their engineer's operations, with the exception of an irrepressible member who has repeatedly and strongly urged that the corporation should obtain the opinion of one or two leading harbour engineers as to the causes of the shifting of the bank, and as to what the Mersey is doing. We know nothing of the member in question but his name, which is of no consequence here; but, judging from the obvious facts, we are disposed to back him. We fear the matter is likely to prove a more serious one than the corporation authorities are aware of, and may throw great difficulties in the way of the steamboat traffic of the Mersey, besides the loss or damage of property. It is clearly a case for investigation by the most experienced authorities in harbour engineering. They might be able to determine the causes of the shifting of the bank. We were not able to come to any conclusion on the point, except the negative one that we do not believe it has, as some people seem to suppose, anything to do with the effect of the landing-stage itself upon the action of the river. This would, under ordinary circumstances, be all the other way. The old smaller landing-stage, which was moored in the same position, so far from showing any tendency to lead to the accumulation of sand, had scooped a depression in the bed of the river under it from the scour of the water beneath it, which is just what might be expected from the effect of a strong ebb (and the ebb in the Mersey is very strong) running under such a floating obstacle. The causes of the present difficulty in the Mersey must be looked for, we surmise, from changes in the river itself. If the engineer's sluicing operations are carried out, however, we shall be considerably interested to see the result.

GROWTH AND ASPECT OF DUBLIN.

BLACK SPOTS.

As on some former occasions, we have made a circuit of a large portion of Dublin and its environs with a view of seeing what changes for the better are taking place. Notwithstanding some building improvement, in a sanitary direction, most of the defects we previously pointed out remain unrectified. The old quarters of the city, on the south side of the Liffey, and the old and more modern quarters on the north side, are unimproved and hastening to that description of rapid decay which bespeaks danger to the public safety, and a large measure of demolitions at no distant date. It requires a knowledge of the eighteenth-century growth and position of Dublin to estimate aright the changes that have taken place in the aspects of the city in the present century, and the influences that have been at work in producing the marked social changes. We cannot, however, here enter at length into such a discussion, for it has its political as well as industrial and social bearings. It is a singular and suggestive matter that the finest streets of houses of the northern portion of the city, and that, too, the most modern part of the town, should so rapidly go down, and be deserted by the well-to-do gentry who once resided in them. Since the commencement of the present century a large number of streets on the south side of the Liffey,—once busy, industrial centres,—have been decaying, but not until a quarter of a century since did any marked decay become visible in respect to a large number of streets north of Sackville-street, embracing Rutland and Mountjoy squares; Gardiner and Gloucester streets, Summer Hill, and contiguous streets. In fact, this northern portion of modern Dublin, as a built-on portion of the city (with little exception), dates back not more than a century and a half. From the middle of the eighteenth century until its close building was rife in the northern portion of Dublin, and during the period the streets named and scores of others were opened up and built upon. The houses in general were well built, were intended for and occupied by private families, and a large number of them were five stories high. These fine houses now are to a great extent tenement-houses, and the evils inseparable from such buildings under their new conditions are only too apparent. The northern part of the city, with its immediate environs, a century ago and much less, was a fashionable district much recommended by the medical faculty of the period, and much resorted to by invalids. A reaction set in fifty years since and upwards in favour of the southern environs of Dublin and sea-side districts along the bay extending from Irishtown and Merrion to Kingstown. The opening of the first constructed railway line in Ireland, the Dublin and Kingstown Railway, in 1834, gave a great impetus to this fashionable migration. As a link in the chain, the embarkation of George IV. at Dunleary (now Kingstown) led to the improvement of the harbour, and its appointment as the mail packet station, which it remains to the present day. Kingstown grew apace during the last half-century, and with it the other marine districts along the southern side of the bay. The extension of the railway line to Bray through the absorption of this first short branch in the Dublin, Wicklow, and Wexford Railway, further enhanced the southern sea-side environs for visitors and residents, and gradually thinned the northern city and suburban streets of their wealthy and well-to-do families. It is noticeable, however, that within the last dozen years a reaction is again setting in in favour of the northern suburbs a little further a-field, and that from Glasnevin through Drumcondra, to the marine or sea-side district of Clontarf, a considerable amount of house-building has taken place, and is still proceeding. Clontarf offers many advantages for villa residences, for it partly faces the bay, commanding a charming prospect of the Dublin and Wicklow chain of mountains across the water, and a fine inland background of the pleasant seats and farms on the plains of Fingal. The character of the new villa residences and other domestic buildings in the northern environs is not of a high order; indeed, the greater number of them belong to the cheap speculative class, which bespeaks indifferent materials, poor design, and poorer workmanship. In the southern suburban and non-marine townships, much domestic building has taken place within the last dozen years from Upper Rathmines and Rathgar, stretching to the Dodder river, and thence wending round to Donnybrook and Ball's Bridge. Some very fair classes of new villa residences are to be found in these districts, mixed here and there with houses of very flimsy construction, though efforts have been made to give them an ornate external appearance, out of keeping with their internal character and accommodation. Concrete cottage construction is developing to some extent in and about the environs of Dublin, but we have met with some wretched attempts with this material, which are a libel on its name, and do but little credit to the builders. Examination and inquiry on the spot, however, convinced us that the users of the material were the veriest building speculators, and that the mixed rubbish they used showed their unprincipled practices, and the valuelessness of their structures, which are fated to drop to pieces in a short time. *En passant*, we may observe that some excellent labourers' and farm cottages in concrete have been erected throughout the provinces of late, which fully meet the objects of their erection, — economy, durability, health, and comfort.

Pendent to our subject, we will now allude to the question of tenement-houses and artisan-dwellings in the City, matters that we have frequently discussed in relation to Dublin, as well as to English cities and towns. It has been stated that there are in Dublin about 25,000 houses, and of this number it will be near the mark to say 10,000 are tenement-houses,—houses originally built each for a single private family, but now inhabited, most of them by several families, often of the poorest class of workers. Many of these tenement-houses north and south of the Liffey ceased to be private dwellings half a century ago, and more; others only within a few years, but of course in proportion to the length of time that has elapsed since the change, the houses have become more and more ruinous and unhealthy. A large number of these tenement-houses have spacious rooms, and are situated in tolerably wide streets, but a much larger number are situated in back or side streets and courts, narrow, and often uncleansed for several days. In respect to some of the large tenement-houses in the wide streets, the fine garden spaces at their rear which they possessed when belonging to private families, have now to a great extent been built upon by the present owners of the houses, and the good stabling and coach-houses

attached have been converted into human dwellings. Thus, in once respectable localities there is a positive overcrowding unknown to the passers-by in the front streets, who little dream that there is a matted population in the back yards, garden ground, and even inhabiting the old stable-buildings in the lanes behind.

When we imagine houses of this character, five stories high, inhabited by from eight to a dozen families, with another living colony on the garden space behind, some conception may be formed of their sanitary condition and surroundings under their new aspects. It must also be remembered that in most of these houses the original accommodation that barely met the requirements of the residents when the houses were occupied by single families remains almost unchanged. It is needless to say the tenants of these houses, if they clean their rooms at all, are only concerned about the apartments they rent, and as to the staircases and halls, though they are in some cases washed down weekly by some common agreement among the tenants, by the employment of a charwoman, in numerous instances there is a total neglect of even this scant measure of cleanliness. In the southern quarter of the city, under the shadow of St. Patrick's Cathedral, there is a very large number of ruinous old tenement-houses which ought to be demolished forthwith, as they are dangerous to the public health and safety. Behind the northern line of quays extending to North King-street and further, and from the Royal Barracks easterly to the line of Capel-street, there are scores of streets, courts, and alleys, the houses of which form positive rookeries and fever nests. Hundreds of houses in these quarters cannot be improved, and it would be a mercy to demolish them if suitable provision could be made elsewhere for the evicted. This district, we have indicated, is the oldest part of the northern city, and the tenement houses and rooms over small shops inhabited in it are in as bad a condition almost as the much older class of houses in the south city, extending from the line of Bride and Werburgh streets, on through the Liberties and Coombe to Cork-street.

While a structural rearrangement is both feasible and advisable in respect to the best class of tenement-houses in wide streets only a few years ago abandoned by private families, to adapt them to the requirements of their present tenants, no structural alteration is possible in regard to the very old class of tenement-houses in the decayed southern and northern portions of the city above named. A wholesale demolition must sooner or later take place, and the sooner the better, if chronic hotbeds and nursing-grounds of contagion are to be uprooted, and the public health maintained. We have often pointed out that one of the most urgent wants of the town is the erection of a large number of healthy dwellings, not only for the artisan classes, but for the still lower classes of the working population. In London and some provincial towns some advance has been made in this desirable direction; but in Dublin little indeed has been yet effected. There are at present in Dublin an Artisans' Dwellings Company and an Industrial Tenement Company. The former has been a few years in existence, and has erected a number of blocks north and south of the Liffey. We have visited some of those blocks more than once, and though we admit they fulfil some of the conditions of their erection, and are an improvement on the ordinary tenement on the score of health, they do not meet the general want as regards arrangement, space, and rate of rent. The better class, or better-wage-earning class, occupying the rooms in some of these block dwellings, being able to rent more apartments, may feel satisfied; but the rents and spaces are not satisfactory to a class of tenants who are perforce obliged to do with less accommodation. Indeed, there is a class of tenants occupying the rooms of some of these blocks whose places ought to be occupied by their humbler brethren at reduced rents. The commercial principle, of course, is attended to by the company, and we must not talk of philanthropy, though it is quite possible and desirable to blend a little of the latter with the former when the healthy housing of the humble working-man and his family are concerned. We learn that the Artisans' Dwellings Company have about 270 tenements, containing upwards of 1,200 inhabitants. They have erected two-storied cottages, also containing four rooms, and some smaller ones. The larger cottages are let at 7s. 6d. per week, and the smaller sizes range from 3s. 6d. to 6s. The cottages let at 3s. 6d. contain two rooms, a settle-bed, scullery, water-closet, yard, and water supply. The lowest rent, which is 2s., is charged for two rooms in the large houses, but, in addition, it must be stated that separate water supply and water-closet are provided. In the South City, in the old district known as the Coombe, on a site recently cleared by the Corporation, another class of dwellings is being erected. These are on the separate cottage plan, and here about 200 cottages will be provided, and upwards of fifty elsewhere at Manor-street of a similar kind. Two-storied cottages, with sufficient accommodation in each for two families, in certain situations, would be a great improvement on the block or barrack-like dwelling plan. The building of a number of cottages on a quadrangular space, and having a square or open court-yard in the centre, may also under some conditions be judicious in a crowded part of the city. The pure and simple separate cottage plan is the best, and the most neat and appropriate in suburban neighbourhoods. Unlike London, ground is easily obtainable in sundry quarters in Dublin, and the cost of clearing sites in the old quarters of the city north and south would only amount to a tithe of what would have to be paid in London or the suburbs of the metropolis. The large class represented by labourers, porters, messengers, and other miscellaneous kinds of workers, earning from twelve to fifteen shillings per week, are utterly unprovided for in Dublin with house accommodation except of the most wretched and unhealthy kind. The Artisans' Dwellings Company have very few tenements indeed as low as two shillings a week, and in some of the tenement-houses in the city previously mentioned, two shillings have often to be paid for a single room. Several thousands, therefore, of the very poorest of the industrial classes of Dublin are occupying a single room in old tenement-houses, for which they pay a rent varying from 1s. to 1s. 6d. per week. The single rooms in old houses which can be got at 1s. per week are generally filthy and most unfit on the score of health or safety to life and limb. There are several sites in the northern and southern parts of the city which would be available at little cost for the erection of workmen's dwellings, and by the falling-in of leases, the Corporation of Dublin will, in a few months, be in possession of a large district which will be most suitable for the purpose and for opening-up new streets and carrying out other kindred sanitary improvements. The portion of the north-western end of the city, where this land will be available through necessary demolition and improvement, includes a locality, and is joined to others, which for long years have loudly called for sanitary inspection and building improvements. We explored this district years ago, and described its general condition, and we regret to note that much of the evil that produces the high death-rate of Dublin and adds largely to criminal statistics has had its birth in this district or portion of the city.

We must reserve for another paper some further city and suburban notes, respecting work done and undone, and sundry other matters bearing on the social and sanitary condition of the Irish capital.

FORECASTS OF THE CENSUS OF 1881.

THAT disturbance in the position of the centre of population which we recently showed to be in course of operation in London is active throughout the United Kingdom. From day to day fresh facts transpire as to the result of the census; and it will probably not be long before we have at least the approximate total of that vast enumeration. Indeed, the figure of 35,250,000 is already named as that of the total population of the British Islands, and this in spite of a positive diminution in Ireland. But even in England itself that process which has caused such anxiety among the longer-headed statesmen on the other side of the Channel has been partially going on. Eight of the English counties, it is said, show a decline in the numbers of their inhabitants during the decade. The mining industry of Cornwall is shown to be on the decline, and the agricultural districts of Hereford, Huntingdon, and Dorset are also reducing the number of their populations. This is partly explained by the comparison between the census of London and the result of the balance of births and deaths in the metropolis during the last decade. The estimate of the Registrar-General for the population of London by the midst of the present year was 3,707,000, so that fully 120,000 out of the actual population must be immigrants within the decade. If it prove to be accurate that the females throughout the islands exceed the males in the proportion of 18 to 17, one of those features which are held to characterise the physical decadence of a race will be disagreeably prominent.

The general movement of displacement of population, as between Great Britain and Ireland, during the last forty years, may be succinctly stated in a few pointed words.

Since 1841 the United Kingdom has added 30 per cent. of its then existing population to its numbers. This is an increase considerably larger than the total of the population of Ireland in 1841. Since that year, however (the deduction being allowed for in the above statement of increase), Ireland has reduced her population by 38 (accurately 37·95) per cent. So that while the United Kingdom has considerably more than doubled its inhabitants in eighty years (from 16,302,410 in 1801), Ireland, at the present rate of depletion, would eat up or vomit forth her entire population in little more than a century.

THE CLOSING OF THE PARIS *SALON*.

NOT a few of those who have watched in England with any interest the experiment that has been tried this year in Paris, of leaving to the entire body of the artists the management of the annual Exhibition so long known as the *Salon*, formerly under State government, will be surprised to hear that the first year's count of "the new management" has met with what may be considered a perfect financial success. More than 100,000 visitors over last year have passed through the turnstiles of the Palais de l'Industrie in the six weeks the exhibition has remained open, and a very considerable embankment has been obtained after defraying the charges, and by which the artists have been largely benefited.

In London, where what are understood by artistic interests are limited chiefly to the great institution in Piccadilly, it is difficult for people either in or outside society to understand how very generally in all degrees of the upper circles the subject of the fine arts is seriously entertained in Paris, and it is not easy for us on this side of the Channel to comprehend the influence and the significance of the success of this year's artistic experiment, and the direction it may give to the near future of the arts. Fortunately in Paris, although every now and then erratic "cliques" of artists make themselves conspicuous either in true faith or simplicity of feeling, or with the ever-ruling desire for popularity, there exists so strong a faith in the old traditions that the great men,—those who justly acquired their honours,—have always sufficient weight and influence to govern and control the wildest and most outrageous innovations; for even in that city of revolution, conservatism and *Conservatoire*-ism are always alive, though, if one may say so, always progressive.

In the new movement the larger body of artists,—the young artists, as we should call them,—have allowed themselves freely, and with the utmost good sense and propriety, to be led by the men whose work they have long looked up to and revered, and in this way has been secured the friendship, the assistance, and experience of those who have no interest whatever to serve but that of the great interests of art; and in this respect the French artists show their power of adjusting the apparently exceedingly different and uncongenial interests of business and art.

We believe that people have long since given up the idea that artists must be regarded as individuals having no knowledge whatever of the management of what are understood as business affairs. Every now and then stories crop up in England as well as France that show that, as a class, artists are not at all deficient in the occult transactions of the counting-house; the French artists especially show a very respectable ability in adjusting the sensitive character of their artistic pursuits with the more robust machinery of mercantile transactions. In fact, in Paris art has of late years acquired a dignity unknown in the past, inasmuch as many of its most distinguished followers have taken their place on terms of perfect equality, if not with the members of the great Bourse, at least with those of the *petite* Bourse.

What effect all this shrewd acquaintance with business may have on the art of the future some would say it is not difficult to determine; but it is certainly not a little remarkable that, during this "renaissance" of art, in which artists have been and are being so amply remunerated, there are members of the profession whose names are worthy of being ranked with those of the great artists of the past, and who have made themselves prominent and their families affluent. In London, though it cannot be said that the disposition is wanting with our artists to combine the profits of business and art, the ability shown in that direction, it must be admitted, is scarcely as great as it is with their brother artists abroad, for it is not alone in Paris where the business of art is successfully pursued; in whatever artistic seat one may visit, whether it be Rome, Florence, Munich, Dresden, besides a host of minor localities, what is called the life of the poor artist,—that delightful Bohemianism about which we have all read, dreamed, and heard so much,—exists only with the youngest members of the craft. Immediately the smallest success is obtained by the whilom Bohemian, good-bye to the dear old days of struggling study and almost lawless pleasure; good-bye to the artist's hat and the velvet coat, to the mysterious life at the old inn in the forest or by the river-side; good-bye to the stuffy *cafés* in the Quartier Latin; good-bye even to the gardens of the Villa Medici, the *caffé Greco*, and to those hard times that made life so easy and pleasant; good-bye, we have heard some architects say, to the drawing-board and the T-square, for now come the library-table, the diary, the day-book, the ledger, and the cheque-book; a studio in the Champs Elysées, the Parc Monceau or Kensington, a visiting-list, and,—a court suit.

PANTON-STREET, HAYMARKET.

THERE are many old inhabitants of London, and many occasional visitors to the metropolis, who will be able to remember when the Haymarket on certain days of the week,—we think it was twice a week,—presented all the bustle and business of a veritable market for the sale of hay; huge, heavily-laden country wains crowded the whole Haymarket, and the smaller streets adjoining, making the air fragrant with the produce of our pastures. Since then,—it was in 1830 that the market was removed to Cumberland Market, Regent's Park,—the odour of the Haymarket has slightly changed, and of late years it has very justly been considered as a far from savoury spot. Still, throughout its notorious history, it has retained on the eastern side, at least, a high degree of respectability, and the names of Garrard, M'Lean, of Turner and Brecknell, Fribourg, and many others, have bravely withstood, and now may be said to have conquered, the enemy on the other side.

Throughout its history, from the early days of the last century, when the "little theatre in the Haymarket" first obtained the name which, as a term of endearment it has ever since retained, when it was overshadowed by Vanbrugh's (Blenheim Vanbrugh's) big house, afterwards rebuilt by Novosielski, on the opposite side of the way, the Haymarket has been one of the famous streets of London, a street entitled to fame if for no other reason than that it once lodged, it is true at a moment of all but obscurity and certainly of poverty, that master of the English tongue, Addison, an incident in the great man's life which has furnished the brilliant pen of Macaulay with one of his most graphic sketches.

Whether any London authority informs us with exactness as to where stood the house in which Addison resided, we are not aware; indeed, such points are difficult of decision where no exact data exist, and when great changes have occurred. It was a contrast, this Haymarket garret which history tells us Addison occupied, and the home he was to own in later years in Holland House; there was but one point of similarity between them, and that was that they both lay in the fields. But Addison was a man of the world, his sordid surroundings in no way influenced his powers; he had at the time he was writing his "Campaign" travelled abroad, and drunk in inspiration from the "classic ground" of Italy, the beauties of which he was to sing but a short time later. Not that the "Campaign" breathes much of the inspired poet. Addison had not then thought of his great work, for work the *Spectator* can be called, though pieced together day by day. If Panton-street cannot be directly connected with that great literary keystone of our language, its neighbourhood,—that, at least, may be conceded,—once sheltered the creator of the familiar characters and the suggestive thoughts that crowd the pages of that cherished work.

Cunningham, in his "London," has entered no mention of Addison's name in his notes on Panton-street, but in his "Modern London" he has inserted on his clue map to the Haymarket the notice of Addison having written his poem of the "Campaign" in a garret in Panton-street.* Taking this for authority, the house he occupied may very possibly have been one of those that have so lately been demolished to make way for the new Alexandra Theatre, a notice and view of which was published in these pages a fortnight ago.

This new "little theatre near the Haymarket" is progressing rapidly towards completion in quiet Panton-street; James-street, at the back, is another quiet seventeenth-century street; the back entrance of the theatre is, indeed, within a few feet only of the old tennis-court, which bears on a quaint label let into its still stout walls, "James-street, 1673," a court which, at the time when Addison lived in the neighbourhood, was in its hey-day of success. It is not, indeed, difficult even now to imagine the noise and gaiety of the game and the even more boisterous fun at Piccadilly Hall, to which the old tennis-court was attached, disturbing the quiet habit of the thoughtful writer.

Of this Piccadilly Hall, a fashionable gaming-house of the seventeenth century, this old tennis-court of James-street is all that remains, and is still easily detected by its appearance, though no longer echoing to the strange jargon of the marker's language; it is, we believe, now occupied by an army clothier. Of the numerous racquet-courts that in the seventeenth century were so popular, it is one of, if not the last, remaining relic, to speak to the generation of lawn-tennis players, of the complicated and antique pastime of our great-great-grandfathers.

As for Panton-street itself, it obtained its name from Colonel Panton, the last owner of Piccadilly Hall. Lord Arundel of Wardour, to whom Wardour-street,—the happy hunting-ground of so many a collector,—owes its existence, married a Miss Panton. On its south side stood Hickford's auction-rooms, the Christie & Manson's, the Hôtel Drouot, or the Clinton Hall of the days of George I.; from a catalogue of a sale in 1728, we learn that a back entrance, on a level with the street, "facing the Tennis-court in James-street," was available for the sedan-chairs of Messrs. Hickford's fashionable patrons. Hickford's, therefore, we see, stood on the site now occupied by the Alexandra Theatre, whose success we may hope will continue to keep alive the memories of this once fashion-haunted corner of old London.

* Pope asked Walter Harte to ascend three pairs of stairs and enter a small top room above a small shop in the Haymarket; when they were within the room, Pope said to Harte, "In this garret Addison wrote his 'Campaign.'"—See "Handbook for London."

BENTLEY PRIORY.

AMONG the pleasant "Homes and Haunts" just now for sale is Bentley Priory, near Stanmore, for a quarter of a century past the seat of Sir John Kelk, and previously that of two successive Marquises of Abercorn, the property having been purchased towards the end of the last century by the grandfather of the present Duke of Abercorn.

Though it cannot compare in literary associations with Holland House, yet under the rule of the Hamiltons the place was frequented by many of the most distinguished statesmen, poets, historians, and essayists. Pitt would often spend a night here discussing his bottle of port wine with his friend, who owed to him his marquisate; "the travelled Thane, Athenian Aberdeen," lived here for many years, being the stepfather of the present duke, and guardian during his minority; the Duke of Wellington, George Canning, Lord Sidmouth, Lord Liverpool, Spencer Perceval, and Sir Robert Peel were all on the list of the Marquis's occasional visitors; as also were Sir Walter Scott, Southey, Wordsworth, and Samuel Rogers. It is said, at all events, by local tradition, that Sir Walter wrote some portion of "Marmion" in a summer-house in the grounds, and that the same peaceful and tranquil scene inspired Rogers with several lines of his "Pleasures of Memory." Lady Morgan, too; Thomas Moore; and the witty Canon of St. Paul's, Sidney Smith, at various times enjoyed here the hospitality of Lord Abercorn.

The Priory has also more than once welcomed royal personages and even crowned heads. Mr. Thorne, in his "Hand-book of London and its Environs," informs us that George IV., when Prince Regent, came hither with the King of Prussia in order to meet Louis XVIII. Thirty years later, namely, in 1848, the house was taken on a three years' lease by the Queen Dowager, Adelaide, but, unhappily she did not live long to enjoy it. She was in very bad health when she took up her abode here, and she survived her arrival only about a year and a half, dying here in December, 1849. Many of the old people remember her gracious acts of kindness and charity among the poor of Stanmore and Harrow Weald, and well recollect her appearance when she took her carriage drives round the neighbourhood on fine afternoons. We believe that the last occasion on which she appeared in public was when she laid the first stone of the new Parish Church of Stanmore, which almost abuts on the edge of the Bentley Priory Estate.

Lord Abercorn, the then owner of the Priory, had made up his mind to reside almost entirely in Ireland, and consequently the place was scarcely inhabited at all for some three years after the queen's death. It was bought in 1852 by Mr. (now Sir) John Kelk, the well-known contractor, who represented Harwich in the House of Commons for a few years as a supporter of Lord Derby and Mr. Disraeli, and was created a baronet in 1874. Two of his sons having died in early manhood, Sir John and Lady Kelk took a dislike to the place where the sons had spent their boyhood; and, having recently purchased a larger property, Tedworth Park, near Andover, Sir John Kelk has resolved to dispose of the Priory.

The estate at present consists of 466 acres, though, owing to the well-wooded and undulating character of the domain, it looks far more extensive. It "lies within a ring fence," being surrounded on every side by public roads; but, in spite of this fact, no mansion in the three kingdoms is more secluded. Indeed, even when you have walked for some distance in the park, the house does not come into view, although it stands on high ground, nearly on a level with the summits of Harrow and Hampstead Heath. In fact, a stranger might easily lose himself in the course of his search for its exact position.

The park, being so surrounded by roads, has no fewer than six different lodge-gates, from each of which the Priory itself is approached by serpentine drives, between large and almost impenetrable shrubberies of laurels, rhododendrons, and other evergreens, among which are several fine yews, the ancient guardians of the spot when it was still a part of the "weald,"—a forest in reality. By whichever gate, however, the visitor arrives, he must enter the house on the northern side, the carriageway passing under an ivy-covered *porte cochère*. Double folding doors open into a spacious entrance-hall, adorned with a groined ceiling, which is supported by fluted columns in the Classical style. On the left of this hall is an inner hall, containing the grand staircase. This is of Portland stone, with carved balusters of oak, of an elaborate pattern of modern design. The handrails are of ebony. It was erected by Sir John Kelk, and is one of the few alterations made in the general arrangement of the house.

The principal rooms into which we enter from this hall are the billiard-room and picture-gallery, which is circular, and lighted by a glass dome from above. This opens, on one side, into the dining-room, and on the other into the chief drawing-room, the latter being 50 ft. by 30 ft., with a painted ceiling, the fireplaces surmounted by large marble mantelpieces, and the panels between and over the doors showing paintings of classical subjects. The library, which adjoins, has also a fine mantelpiece supported by Siena marble columns. On the same floor are two rooms of much smaller dimensions, now called the "morning-room or study," and the "gentlemen's room." These rooms are of especial interest, as they were those usually occupied by the Queen Dowager, who used the former as her sitting-room, and the latter as her bedroom. In the latter there is a recess,—a sort of alcove, such as is often to be seen in bedrooms in France. In this alcove stood the Queen's bed, and here she breathed her last. Her private boudoir was a room on the first

floor, nearly over her sitting-room. These rooms all have a southern aspect, and were chosen by her on account of their warmth and comfort.

It should be mentioned here that from this morning-room a doorway opens to a corridor or vestibule, with steps leading down into an Italian garden, and with an entrance also into a magnificent conservatory, 126 ft. in length, the central walk of which is paved with marble inlaid with tesselated tiles. In this is a fountain for gold fish. The Italian garden and its terraces extend along the entire south front of the mansion.

Beyond the conservatory is a lawn-tennis court or skating-rink, some 90 ft. in length, and lighted by gas, with a raised gallery for spectators at one end. At the western end of all is a lofty clock-tower or campanile, of the Italian style, from the summit of which an extensive view can be obtained, reaching into ten counties.

The great oak staircase, already mentioned, leads up to the "state apartments" on the first floor. These face the south; their windows open on to a broad verandah, commanding a fine view over Middlesex and Surrey.

Below the Italian garden and lawn the ground slopes away rather abruptly down to a lake about four acres and a half in extent, with a boat-house, bathing-house, &c. The sewage of the house and premises is carried by pipes into a small watercourse below the lake.

On the banks of the lake is a summer-house. Here, it is said, that Sir Walter Scott corrected the proofs of his "Marmion," to which he added, at the suggestion of his host, the Tory Lord Abercorn, a couplet, in which he speaks of Fox,—

> "For talents mourn untimely lost,
> When best employ'd and wanted most."

Of these lines, Lockhart tells us in his Life of Sir Walter, that they came actually from the pen of the Marquis; but this can hardly have been true to the letter. It is far more certain that in the adjoining alcove some lines of the "Pleasures of Memory" were penned by Samuel Rogers.

The visitor should not leave Bentley Priory without paying a short visit to the "Cedar Garden," on the north side of the house; he will not easily find one more beautifully adorned with cedars of Lebanon, yews, and other evergreens; and he cannot fail to be struck with the circular rosary and the orangery.

We have said nothing here of the fernery, the lime-tree avenue, and the rustic summerhouse, consisting of two rooms, in the midst of rockery, and evergreens, and ferns. This used to be Queen Adelaide's favourite resort on fine summer afternoons, and in the quiet seclusion of this spot she would sit for hours, reading and working, or conversing with her ladies-in-waiting.

The stables are capacious, containing ten large stalls; besides which, there is another building capable of holding forty visitors' horses.

It must be owned with regret that antiquaries and county historians like Lysons can tell us but little of the back history of Bentley Priory. All that is known of it seems to be that in the days before Henry VIII. there was a priory here, though the order to which its members belonged is unknown. Of course, like other religious houses, it was seized and suppressed along with the rest of the lesser monasteries; its revenues were, however, assigned not to the king, but to the monks of Canterbury. We learn that "in 1543 Archbishop Cranmer gave to the king, in exchange for other lands, the late Priory of Bentley, with all lands, tenements, &c., thereunto belonging in Harrow and Stanmore, being parcel of the possessions of St. Gregory's Priory at Canterbury."

The king, as soon as he got possession of the lands, granted them to two of his friends named Needham and Sacheverel, who sold them a few months afterwards to Elizabeth Colt. We hear little or nothing of the subsequent history of the estate until the reign of Queen Anne, when it would seem to have been in the hands of the Coghills. A member of that family, in 1734, left it to a nephew, who again bequeathed it to a relation of another name. Having passed through the hands of a Mr. Bennett, a Mr. Waller, and a Mr. Duberly, in 1788 it was bought by the Earl, afterwards first Marquis, of Abercorn. It was this nobleman who expended a large part of his Irish and Scottish rents in making large additions to the original house, and made it one of the "stately homes" of Middlesex. Sir John Kelk has left the fabric much as he found it, adding only the projecting Italian central front on the south.

ON THE MAINTENANCE OF PURE AIR IN DWELLINGS.*

THE question of how best to maintain pure air in a house has an important influence in domestic economy, because the health and the vigour of the inmates depend upon their living in a pure atmosphere.

The inhabitants of close rooms, persons who breathe air which has already been breathed, are subject to diseases which may cause death, amongst which may be mentioned pulmonary consumption and certain classes of fevers. But whilst some persons may be killed outright by breathing air which has been polluted by the breath of other persons, the majority are subject to a low condition of health. The reason of this is partly because the oxygen of the air is necessary for keeping in activity the chemical processes which are bound up with life, and that in the act of breathing, that is, in taking air into the lungs, the oxygen in the air is taken up by the lungs and the expelled air is thus deprived of its oxygen; and partly because an individual in expelling the air from his lungs in the act of breathing expels with the air carbonic acid gas, which in large quantities is fatal to life, as well as a large quantity of organic matter, *i.e.* a portion of his body, which latter has a tendency to putrify rapidly in stagnant air, and which may thus become a dangerous poison.

Those who live in a close atmosphere have their vital energy impaired; they are less able to perform work. They more nearly approach to the condition of animals in a state of hybernation; they are less able to enjoy life. There is a case mentioned of a dressmaker who employed a large number of women in a very close room at a low rate of wages. Upon a remonstrance being made as to the condition of the atmosphere, ventilation and fresh air were supplied to the room. The women then complained that their wages were insufficient, because in consequence of the fresh air they were so much more hungry and required more to eat. That is to say, their vital energy was increased; and no doubt their capacity for work was much increased also. The same thing occurred when ventilation was introduced into soldiers' barrack-rooms, through the efforts of Lord Herbert of Lea. The soldiers complained of the insufficiency of their rations, which had to be supplemented.

Mr. Leeds, a ventilating engineer of New York, mentions an experiment which he made with some flies illustrative of this. He confined a certain number of flies in a bottle full of breathed air and tightly sealed up. He also confined a certain number of flies in a bottle through which he allowed fresh air to circulate. The flies in the bottle filled with pure air were very lively, but they all died in twenty-four hours, as they had no food. The flies in the impure air became at once very stupid and could not fly about, but they lived ten times as long as those in the pure air. And thus we find that many poor people living in unventilated houses exist sometimes to quite an advanced age, but they are often sick and feeble. Therefore, when a person finds he cannot earn his living, or if he does earn it he is sure he cannot get sufficient food to eat, he had better imitate the hybernating animals as nearly as possible, and get into some close, unventilated place, and lie down in perfect quiet and repose, and not fret at all, and he will then be able to get along on very little food. But, if full employment is to be made of their faculties, persons must live in pure air.

Stagnant air can never be pure air. There are being given off perpetually into the atmosphere a number of deleterious substances,—the emanations from the breath and other exhalations of every living creature, — the emanations arising from the putrefaction of dead creatures or of decaying vegetable substances, the miasma from marshes, &c. These various poisonous emanations are being constantly changed into non-poisonous forms, or burnt up, as it were, by contact with the oxygen of the atmosphere, which is itself being continually renewed from other sources. The movement of the atmosphere facilitates this burning up of the poisonous emanations.

The atmosphere is always in movement. The Registrar-General gives the average movement of air as measured by an anemometer at Greenwich to be about 17 ft. in a second, or 12 miles an hour. It is rarely less than 6 ft. a second, or 6 miles an hour. Thus, if a single individual be assumed to occupy a space of 6 ft. high by 1 ft. 6 in. wide, situated in the open air, there would pass through this small space in an hour nearly 200,000 cubic feet of air, even when the movement of outer air is as low as four miles an hour.

In order to maintain purity of air in a house, it is necessary to keep up a continual movement of the air, supplemented by a continual change in the air. This movement and change of air must be maintained without causing a sensation of draught. The science by which this is effected is termed ventilation. It is a science of much simplicity in climates or in weather when the windows and doors can be kept perpetually open; but in this climate, especially in winter, the necessary condition of the avoidance of draughts makes it a very complicated matter, and renders it necessary in providing for a change of air to provide also for warming the inflowing air. The great differences of temperature which occur in this country, moreover, produce numerous other complications.

In considering the question of ventilation, the first question which arises is as to the quantity of fresh air which is required for change of air. If it were desired to supply in a room a volume of fresh air comparable with that supplied out of doors, it would be necessary to change the air of the room from three to six times in every minute; but this would be a practical impossibility. And even if it were possible, it would entail conditions very disagreeable to the occupants, who would have to live in a gale of wind. It is thus evident that in considering the condition of air indoors, we have to seek a standard of admissible impurity in the air, rather than a standard of purity of air comparable with what we have out of doors.

In judging of the amount of impurity which may be allowed in an inhabited air space, the sense of smell, when carefully educated, affords the best indicator of the relative purity and impurity of different kinds of air.

The volume of air which is required to maintain the air of a room at a uniform standard varies with the character of emanations given out by the occupants of the room. For instance, the emanations given out by sick persons, and especially those from bad surgical cases, require for their dilution a greater volume of air than is requisite in the case of healthy persons.

Calculations have been made which show that, theoretically, about 3,000 cubic feet of fresh air per hour per individual should be afforded to preserve the air in a confined space at the required degree of freshness; but, in our climate, a careful practical examination of the condition of rooms in barracks and hospitals, judged of by the test of smell, shows that arrangements which appear to provide for a much less amount than that obtained by theoretical calculation, will keep the air of rooms occupied by healthy persons in a fair condition. These results have pointed to about 1,200 cubic feet of air per hour per individual.

This variation from theory seems to be partly due to the fact that there is always a change of air to a certain extent going on in a room. The walls and ceilings themselves allow of a considerable passage of air through them, which is proportioned to the difference between the temperature outside and inside a house, and varies with the materials of which it is constructed. Thus, ordinary bricks are nearly twice as pervious to air as sandstone, and plaster is much more pervious than brick.

If you look at the ceiling, you will see that an old ceiling is blackened where the plaster has nothing over it to check the passage of air, and that where the joists come, and the air has not passed so freely, it is less black. If you break the plaster, you will find that its blackness has arisen from its having acted like a filter, and retained the floating particles of dirt while the air passed through. Ill-fitting doors and windows allow of the passage of a considerable quantity of air.

A sleeping-room is very warm at bed-time; a rapid fall of temperature outside occurs, and at once a considerable movement of air takes place. The majority of occupiers of sleeping-rooms in England close their windows at night; they often block up the chimney by a register or otherwise to prevent the blacks falling. They have no special inlet or outlet for changing the air. In the morning the room would, no doubt, be very close; but if it were not for the continual insensible change arising from the air

* Paper by Captain Douglas Galton, C.B., F.R.S., read at the Domestic Economy Congress, Royal Albert Hall, on the 23rd ult.

passing through the walls, doors, and window-chinks, &c., the occupants would be asphyxiated. A well-built house unprovided with special means for the inflow of fresh and outflow of vitiated air, is a real source of danger. For these reasons the form, position, and surroundings of a building are important, because the air thus insensibly coming in, as well as all other air admitted, should be taken from pure sources.

Rooms with a large amount of outside wall-space have a better chance of obtaining fresh air than rooms whose walls separate them from other occupied rooms; because the air, filtering in from an occupied room, would necessarily contain more impurities than fresh outside air. The inflow of air to a room takes place not only from all sides, but also from below. The air does not cease where the ground begins, but air permeates the ground, and occupies every space not filled by solid matter or by water. Thus, if you build on a dry, gravelly soil, where the interstices between the stones are naturally somewhat large, you practically build over a large stratum of air. This air moves in and out of the soil in proportion to barometric pressure, and with reference to the wind.

The fact of this continual free passage of air in and out of the ground makes it important that the ground we live on should be free from impurities. We might just as well (indeed, probably far better) live over a pig-stye than over a site in which refuse has been buried, or in which sewer-water has penetrated, or over a soil filled with decaying organic matter; because in cold or damp weather, when the air in the dwelling is warmer than the air outside, the upward movement of this warmer air will draw in air to supply its place from the ground on which the dwelling stands. This movement would be prevented if the whole surface under the dwelling were covered with an impervious material.

It has been the custom of many London builders to lease a site, to remove the valuable gravel and sand, and in order to fill up the hole thus caused, to invite people to deposit rubbish, often including foul garbage, on the site; and when the hole is thus filled up, to build a house over it. People are then astonished at fevers and sickness prevailing in new houses.

The size of a room does not permanently affect the purity of air in the room; that is to say, that the number of occupants in a large room being the same as the number in a small room, the same amount of air admitted and removed will eventually keep the two rooms in the same condition of impurity.

The degree of impurity in the air of an occupied room ultimately depends solely on these two things:—

1. The rate at which emanations from the occupants are produced.

2. The rate at which the air of the room is being replaced by fresh air.

The advantage of large space is that the large room is longer in reaching the state of normal impurity than the small room. For instance, the following table shows the time required to bring air to a definite uniform standard of admissible impurity (viz, 0·2 per 1,000 of $C O_2$), in different sized rooms:—

			H.	M.	S.
One man in	10,000	cubic feet	3	20	0
,, ,,	5,000	,, ...	1	40	0
,, ,,	1,000	,, ...	0	20	0
,, ,,	600	,, ...	0	12	0
,, ,,	200	,, ...	0	4	0
,, ,,	50	,, ...	0	1	0
,, ,,	30	,, ...	0	0	36

But besides this, the inflow and outflow of air necessary to maintain the standard of impurity is less perceptible in a large than in a small room; for the chief difficulty of keeping ventilation in action arises from the draughts it causes. Every one objects to a current of air which affects him, and desires that if a window is to be opened it shall be situated behind some one else. There is, moreover, in practice, this advantage in the larger rooms, viz., that the larger wall surface and the more numerous windows will allow of a larger insensible ventilation, and thus larger rooms will have an apparently less degree of impurity than small rooms. Although the uniform diffusion of carbonic acid is very rapid in the air of a room, the organic emanations given out do not in practice diffuse themselves either rapidly or uniformly. They hang about in corners where there are obstructions to the flow of air, or near the ceiling. On this account, some space between the occupants of a room is desirable. In sleeping-rooms and in hospital wards, and, in fact, in all rooms where the height is above 10 ft. or 12 ft., the floor-space becomes of more importance than cubic space. For adults in sleeping-rooms it is undesirable to have a floor-space for each of less than 50 superficial feet. And the floor-space in dormitories in schools should certainly not be less for each boy or girl than a space of 50 superficial feet, or say 10 ft. by 5 ft. or 6 ft. 3 in. by 8 ft. In hospitals, from 90 to 120 superficial feet of floor space is generally afforded; and in fever hospitals, and in surgical wards, much more floor-space is frequently desirable.

As before mentioned, the ventilation of a room means the removal of a portion of the air in the room, and the supply of a similar quantity of fresh air to take the place of the vitiated air thus removed.

This change of air may be effected in two ways,—1, by forcing fresh air into the room and allowing this fresh air to displace the air already in the room; or, 2, by drawing the air out of a room and allowing the fresh air to flow in to fill its place. In some cases a combination of both methods is adopted.

The extraction of the air is that which is simplest and most generally adopted. The extraction may be effected by fans or pumping machinery, but the usual system is to depend upon differences of temperature for determining the movement of air. The molecules of air are but feebly attracted to each other, and increases of temperature or diminutions of pressure separate the particles from one another. Similarly, decreases of temperature bring the particles nearer together, and thus one cubic foot of warm expanded air weighs less than a cubic foot of cold air.

It follows that as warmed air expands it ascends, and as cooled air contracts it falls. It also follows that as the warmed air ascends the air around rushes in to fill its place. Everywhere this heating and cooling of the air is going on; the sun's rays, the proximity of a warm body, the vicinity of a cool shaded surface, all cause movements in the currents of air.

In a room, as air is warmed by the bodies of the occupants, it ascends; it comes against the glass of the windows, cools, and falls down. Draughts felt near the windows are not necessarily air coming in from the window, it may simply be the cooled air falling. It is on this law of the dilatation of air that all the movement of air depends, from the winds and hurricanes, to the ventilation of our houses, except where we propel air by fans or other mechanical appliances.

The law which regulates this movement of the air in a confined space or a room, when the temperature is higher than that of the outside air, depends upon the following considerations:—

1. Upon the difference of temperature of the air inside the confined space, as compared with that outside.

2. Upon the area of the aperature through which the air passes.

3. Upon the height of the column of ascending air.

Thus velocity of air in a chimney or flue depends on the height of the flue and temperature of the air as it ascends. Therefore, a fire lighted at the bottom of a flue produces a current upwards in the flue. The extraction of air by flues is the plan usually adopted.

The extraction of air by a properly constructed fan, worked by a steam-engine, would be more economical than the flue extraction, especially when the warming of the air, which takes the place of that removed, is taken into account; but the strong recommendation of the chimney is its simplicity and its permanence. It requires comparatively little repair, and no skilled labour to look after it. The convenience of this system causes it to be almost universally adopted. The open fireplace is one example of it; the sun-burner is another example; but the system is also applied in every room in which there is an opening at the upper part, out of which the warm air can pass, and an opening below, through which fresh air can flow in. Thus, an ordinary sash-window is an example. If the top sash is lowered and the bottom sash raised, the warmed air passes out of the room at the top, and the cooler outer air flows in below.

In the open country air is always in movement. In a town the buildings tend to prevent the rapid circulation of air; and, therefore, the smoke from the houses and the impure emanations from stables, from unclean street surfaces, and from ash-pits, hang about and render the air impure.

In a house the space is so sub-divided that air is necessarily stagnant unless special arrangements are made to provide circulation. Of course, in the summer and in warm weather, it is comparatively easy to obtain circulation of air throughout a house, and to fill the house with pure air by opening windows and doors. But in winter and in cold weather or wet weather, when doors and windows are closed, it is necessary to provide special means for creating a circulation of air.

A change of air in a room means that the air in the room which is deteriorated by the breath of the occupants shall be replaced by fresh air. In cold weather it is necessary to provide in some manner for warming this fresh air, or else the temperature of the room would be so lowered as to be injurious.

In most London houses, the ventilation of the room in winter, and the warming of the air, depend on the open fire-place; and there is no better engine for the ventilation of a room. The way in which an ordinary open fire-place acts to create circulation of air in a room with closed doors and windows is as follows:—The air is drawn along the floor towards the grate; it is then warmed by the heat which pervades all objects near the fire, and part is carried up the chimney with the smoke, whilst the remainder, partly in consequence of the warmth it has acquired from the fire, and partly owing to the impetus created in its movement towards the fire, flows upwards towards the ceiling near the chimney breast. It passes along the ceiling, and, as it cools in its progress towards the opposite wall, descends to the floor, to be again drawn towards the fireplace. A fireplace is thus powerful enough to draw into the room all the air it wants, and for this purpose will use indiscriminately all other openings, whether inlets or outlets, if necessary.

The rays from the fire pass through the air of the room without warming it; but they warm the surfaces, on which they impinge, of the walls and furniture, and thus communicate the heat to the air. Thus, in a room with an open fire-place, every object in the room contributes its heating surface to warm the air, which is drawn in cold from the outside by the fire.

But the cold air is liable to produce draughts. The only way to prevent draughts is to adopt means for providing fresh warmed air to supply the place of that removed. This may be effected in various ways. The fresh air may be brought to the back of the fireplace and there warmed by some of the spare heat which otherwise would pass up the chimney. By this means each room would be self-contained, so far as its heating and ventilation are concerned. Or, if preferred, a stove may be placed in the basement of a house, and fresh air brought to this stove to be warmed, and then conveyed by flues in the walls to the several rooms, and then admitted in convenient positions; or else the stove may be placed in the staircase or hall of a house, and fresh air be brought to it to be warmed, so that the staircase or hall shall form a reservoir of fresh air, from which the open fires in the several rooms draw supplies of air through the doors or through special openings.

Any of these arrangements will prevent draughts being felt in the rooms. Wherever an open fireplace is used, there should be some arrangement for the supply of fresh warmed air in winter to replace the air carried up the chimney; but as the fire itself warms the walls, and all the articles in the room, by its radiant heat, it is not desirable that this fresh air should be warmed to any great extent. Probably a temperature of 54° to 56° would be ample, as it would soon acquire in each room the supplemental heat which the occupants would desire. The lower the temperature of the fresh air, the larger would be the quantity of oxygen contained in a given bulk of air. Thus, a person breathes on an average when tranquil 16½ cubic feet of air per hour. A cubic foot of dry air at 32° contains 130·375 grains of oxygen, and with the air at 32° he would receive 2,164 grains of oxygen into his system. At 80° temperature, the air contains only 118·7 grains in a cubic foot, and in breathing 16½ cubic feet of air at 80° he would receive into his lungs only 1,971 grains of oxygen, or only about 90 per cent. of the oxygen which he would inhale at the temperature of 32°. Therefore, the lower the temperature at which air can be supplied

for breathing, consistent with comfort and the avoidance of draught, the better.

There is so great an advantage in the open fire-place as an engine of ventilation for rooms, that although many other and more economical means of heating our rooms have been suggested, it is questionable whether, on the ground of health, it would be wise to give it up.

One great evil from which we suffer in London is the smoke in the atmosphere, and this is aggravated by our open fireplaces, but not necessarily. The smoke is not only an evil in itself, but it aggravates the effect of the fogs which prevail, especially in this country. It seems that the tarry matter given out by the combustion of coal coats over the watery particles which float in the air in time of fog, and thus retards the evaporation, and causes the fogs in towns to be more continuous than they would otherwise be. The fog and smoke are a serious inconvenience to ventilation in London, because ventilation means the supply of pure air. The outside air in London is impure, and the only way to obtain comparatively pure air in the house is to pass the fresh air drawn in through cotton-wool filters. This entails a considerable amount of trouble, as the cotton-wool filter will, in foggy weather, have to be renewed every three or four days. But even on the finest days in London, when the air is what is called clear, it will be found that the atmosphere is loaded with impurities. There is some smoke, much dust, of which the chief part arises from the enormous amount of horse-manure spread over the streets, and many other impurities incidental to a thickly-peopled area. These impurities, and even the fog and smoke over a town such as London, do not rise to any very great height. The tops of the church-towers, and of the loftiest houses, have been sometimes observed to be in a clear atmosphere on days when the streets are wrapped in fog. At the level of the tops of such lofty structures a much purer air may always be found than prevails near the street level, and this purer air could be brought down for the supply of houses. In all public buildings in London, especially in the Houses of Parliament, the supply of fresh air should invariably be from this purer source.

But this question should be looked at from a wider stand-point. The population of London, at the beginning of the century, did not exceed 960,000. It is now nearly 4,000,000. Thus a population not much smaller than that of Portugal, which is spread over 34,500 square miles, is concentrated in London on to 118 square miles. The houses spring up on the outskirts of London on every piece of spare land. Each house contributes to the smoke of London, and this smoke-contributing area, and the inhabited area which contributes impurities to the atmosphere, grow more rapidly than the arrangements made for removing the impurities, or for diminishing smoke.

We have had much legislation upon the subject of improving the purity of our rivers and water-supply, but pure air is as important to us as pure water, and this question has been practically left untouched. There are Acts of Parliament prohibiting smoke, but, unfortunately, these have been left to be a dead letter, because of the private interests which they assail.

Those who live in the country find the pure air come to them on all sides, because of the constant movement which goes on in the atmosphere. Those who live in London must turn their attention to some method of diminishing the impurities with which London air is charged, or of putting in movement the atmosphere so charged with pollution. The first and most obvious step is to relieve the air from the enormous amount of smoke which is now daily thrown into it, and the next is to remove all refuse from the streets and houses as rapidly as possible. As a contribution towards the well-being of the country, each householder should be bound to adopt some method of preventing smoke in his household.

The question of the avoidance of smoke is essentially one which comes under the cognisance of a Domestic Economy Congress, because smoke means waste; the consumption or prevention of smoke is the utilisation of waste, because when smoke proceeds from a fire it shows that a large part of the fuel is going away into the atmosphere unconsumed. There have been many suggestions made to prevent smoke,—the form of the fireplace, the use of anthracite coal, the use of gas instead of coal, or the use of gas in combination with coal.

One of the first persons who turned his attention to the prevention of smoke was Dr. Arnott. He proposed a fireplace which practically produced no smoke; but it had this inconvenience, that it gave a very dull fire. This inconvenience might, however, be easily remedied by a not very great alteration in the arrangements for admitting air to the top of the fuel.

It would be beyond the limits of this paper to enter upon the very large question of the various forms of grates, or of the other means for preventing smoke, and such a discussion would now be premature, as a committee has been formed for the purpose of testing, in the course of the coming autumn, various new forms of fireplaces devised to prevent smoke.

There is scarcely any question at the present day more important to the inhabitants of London than that of devising means to purify the atmosphere. Parliament can make general laws prohibiting smoke, but the enforcement of the laws must rest with the local authorities. In London, unfortunately, the authorities whose duty it is to enforce the existing law have been very supine in the matter; and London suffers far more than ought to be permitted from the smoke of factories and large chimneys. As regards the chimneys in private houses, although each gives out only a small quantity of smoke, the aggregate of smoke contributed by them is as serious an element in the pollution of London air as that from the factories. The source of pollution is beyond the reach of present legislation. It is a matter dependent upon the action of each individual householder. The most serious cause of air pollution in each house may be said to be the kitchen chimney, or the chimney of the hot-water apparatus. These must be in operation winter and summer. There are, however, numerous arrangements for cooking and for supplying hot water which do not give out smoke, and which are far more economical of fuel than the ordinary kitchen grate. The use of these would not affect the comfort or the ventilation of the living-rooms. The use of one or another of these arrangements would entirely abolish smoke from kitchen chimneys, and if kitchen chimneys and fuel used for cooking ceased to give out smoke, the atmosphere of London would be sensibly purer than it now is.

The other cause of impurity in London air,—viz., that arising from dust,—is more a matter for the local authorities than for the individual householder. The streets should be washed every morning, and swept more than once a day; the dust-carts should be covered; dust from dust-holes should not be brought up in open baskets and emptied, as it now is, into the open carts, so as to scatter the largest possible amount into the atmosphere, and in the face of the persons passing by; but dust should be daily collected from every house, and received in closed receptacles, to prevent any of it being spread in the atmosphere.

If the local authorities would set themselves seriously to work to prevent the pollution of London air in this direction, and if every individual householder would take the trouble to adopt some method of diminishing the smoke from his own house, a sensible effect would soon be produced on the cleanliness of London and on the purity of its atmosphere.

A SCOTTISH ARCHITECTURAL EXCURSION.

LINLITHGOW: BINNS HOUSE: ABERCORN CHURCH.

THE annual excursion of the Edinburgh Architectual Association took place recently, and was largely attended. Under the arrangement of Mr. John McLachlan, president, they proceeded to Linlithgow, to examine the remains of the Palace and St. Michael's Church, which is still used as a place of worship. Mr. Kerr, architect, Edinburgh, in describing the palace, noticed that the name, Linlithgow, was of ancient origin, signifying the Lake of the Sheltered Valley, which even now applies to the natural features of the site, which is supposed to have been occupied as a Roman settlement, as pieces of pottery and other remains have been dug up from time to time. In some of the older records reference is made to a chapel, which is believed to have existed here along with some other buildings, as David I. of Scotland occasionally resided here, about 1134. Much reliable information is now available regarding this and other buildings from the Lord Treasurer's accounts and original ancient documents recently published by the Government, from which it appears that Edward I. erected a peel about 1300, and spent Christmas of 1301 here. This peel was taken by stratagem, and dismantled, by order of Robert the Bruce, in 1313, but it appears to have been repaired, and additional buildings erected. These, with the parish church of St. Michael adjoining, were destroyed by fire in 1424, the year in which James I. returned to Scotland, with his Queen. In 1425 he began the erection of a new palace and to rebuild St. Michael's Church. The portions of the palace supposed to have been erected at this time were upon the west and south sides; about 1488 part of the south side appears to have been in progress. In addition to the kings already named, Robert II. and III. resided frequently in the castle or palace. James I. visited it about 1428, and the Royal Family of Scotland occasionally occupied it up to the time of James VI., who left Scotland to ascend the throne of England on the 5th of April, 1603. His son, Charles I., was the last of the Stuart kings who visited Linlithgow Palace. Prince Charles Edward also visited it in 1745, and in the following year it was burnt, when occupied by Hawley's dragoons, and reduced to the state of ruin in which it now appears. The palace forms a quadrangle around an inner court, having high towers, with stairs, at the corners and in the middle of the north side, connected together by lower buildings. The fountain in the centre of the court was erected by James V. about 1538. There was also an outer court towards the south, enclosed by walls at the east and west ends, St. Michael's Church and the outer porch of the palace forming the south boundary. Looking at the building chronologically, the oldest part is the south-west tower, erected by Edward I., and portions of the west and south sides built by James I. The next is the north-west corner, and original part of the north side, erected by James III. and IV.; the latter also built the east side, containing the Parliament-hall and original entrance. James V. is said to have erected, about 1535, a portion of the south side of the quadrangle, built up the principal entrance from the east, and formed that upon the south side of the palace. He also erected the entrance gate-house or porch to the outer court, about 1530. The panels above the gate contained the insignia of the Orders of the Garter, Thistle, St. Michael, and the Golden Fleece, conferred upon him by Henry VIII. of England, Francis I. of France, and Charles V. of Germany. The north side, previously noticed, being much decayed, part of it fell in 1607. James VI., although residing in England, retained an interest in his ancestral palace, and had this side rebuilt between 1617 and 1628, from designs by Inigo Jones. The dates 1619-20 appear upon the interior front. King James also made extensive alterations upon the remainder of the Palace, adapting many of the older apartments to the present arrangements. The barbican outside the original east entrance has occasionally been considered to be a part of the castle erected by Edward I., but upon close examination it does not appear to be older than the date of the building adjoining, erected by James IV. The architects or masters of works engaged at the Palace from 1425 to 1467 appear from the accounts to have been John of Walton, Robert Wedale, Robert Livingstone, John Holme, John Weir, and Henry Livingstone. Sir James Hamilton was architect to James III. and IV., and Inigo Jones to James VI. Parliaments were held here in 1388, 1389, 1545, 1585, 1593, and in 1646, when Edinburgh was visited by the Plague.

On ascending to the first floor, the party traversed the several principal apartments. In the north-east corner is a large kitchen, with ante-rooms on the north and east sides. The former communicates with the large dining-room and private apartments behind, extending along the north side of the Palace. The other communicates with the Parliament Hall, which extends along the east side, measuring 98 ft. by 30 ft., with a gallery at at the north end, and large richly-carved stone corbels spaced along the side walls. This apartment, which is lofty, had an open-timber roof. Behind the south end of the hall is a retiring-room, robing-room, and strong-room; from these, extending along the south side, is the chapel, which contained a gallery at the west end, and is lighted by tall windows in the south side, with bold richly-carved stone corbels and canopies upon the intermediate piers. There are also some remains of the tile paving of the

floor. At the west end of the chapel are the hall and priest's chamber, communicating with a corridor towards the inner court. Along the west side is a large room, in which Mary Queen of Scots was born, with stairs from it leading to the apartments above and below. Adjoining the north end is a State council-chamber, James III.'s bedroom, strong-room, and oratory, terminating with beautifully ribbed groined ceilings. The council-room shows the plan of the complete paved floor, composed of tile and indented stone. The upper floors have been occupied as bedrooms and other private apartments. The top of the north-west corner stair is covered by an interesting groined roof, the ribs resting upon carved corbels, with the letters J and M intertwined, being the initials of James IV. and his Queen Margaret, daughter of Henry VII. Over this is a groined turret known as Queen Margaret's Bower, referred to by Sir Walter Scott in the fifth canto of "Marmion" as the place where Margaret retired after her husband had determined to advance to Flodden.

> "His own Queen Margaret, who in Lithgow's bower,
> All lonely sat, and wept the weary hour."

There is also a stone-paved flat forming part of the roof of the south side of the quadrangle, enclosed by the high sloped roofs at the back and ends, and communicating with the four corner stairs. The ground-floor is occupied at the south-east corner by several kitchens for the domestics and guard, also by a buttery and two guard-rooms. In the one at the entrance from the south the Regent Murray died, on the evening of the 23rd January, 1570, after being shot in the early part of the day by Hamilton of Bothwellhaugh. The south-west tower contains the prison, and the south-east a small stable for the king's horses. Adjoining the old east entrance is a dungeon, also said to have been occupied as a lions' den, but which may have ultimately been converted to another purpose. It is, however, curious to note that in the Lord Treasurer's accounts, there is a charge in 1330 for food to a lion belonging to David II. In 1452, there was a payment to a keeper of a lioness belonging to the king. In 1474, James III. got a present of a lion. There was a lions' den at Stirling Castle, a vaulted chamber in the Palace of Linlithgow, and a "house of the lions" at Holyrood in the time of Queen Mary. From the bottom of the stair at the north-west corner, there is a passage communicating with a door in the north front, leading to the archery-butts and boat-slip at the side of the loch. While viewing these and walking round the Palace, an opportunity was had of observing particularly the details of the masonry and stone-carving, which, except that upon the portion erected by Inigo Jones, shows both externally and inside the Palace a decidedly French character. The numerous chimney-pieces are of stone, of various designs, richly moulded and carved.

St. Michael's Church, adjoining, was next visited. It is still used as the parish church. Although an earlier chapel or church may have existed upon the site, the present building appears to belong to the fourteenth and fifteenth centuries, and is admitted to be an important specimen of an ancient parish church, being of large dimensions, and containing interesting peculiarities in its details. It has been a cross-church, with an octagonal termination to the chancel. The tower at the west end was surmounted by a crown, similar to that of St. Giles's, Edinburgh, which, from fear of its insecurity, was taken down about 1821. The beautiful west door and tracery of the windows are worthy of careful study; the tracery, which at first sight appears Flamboyant, is strictly Geometrical, and no design is repeated on the same side of the building.

Proceeding through a finely-wooded district to Binns House, the property of Sir Robert Dalzell, who kindly granted the necessary permission to inspect the apartments, the ancient family mansion appeared amidst groups of old trees upon the western grassy slope of Binns Hill. The oldest part of the building was erected in 1623, and by the additions made from time to time formed an irregular mass, which has been assimilated by alterations in the castellated style carried out early in the present century. The principal apartments, however, have not been much interfered with, and the panelled wall-linings, doors, and finishings remain, showing the variations in style belonging to the respective periods of the additions. There are also several beautiful plaster ceilings of different designs, converted, in some cases by single mouldings and in others by floriated bands, into geometrical forms interspersed by bold pendants. In one of the rooms a frieze is introduced, filled with fruit and foliage, which has a rich and pleasing effect. There are also some interesting specimens of ancient furniture in good preservation. The collection of family portraits, and others of the Royal family of Scotland, next claimed attention. It was said that some of these had been saved from the flames during the burning of Linlithgow Palace in 1746. When examining the portrait of General Dalzell, who was at the head of the army in Scotland in 1681, and the chief officer in raising the regiment of Scots Greys in that year, it was remarked that the visitors were upon the spot where the regiment was embodied while its two hundredth anniversary was being celebrated in London.

Leaving the pleasure-ground of Binns House, the party directed their attention to Abercorn Parish Church, still occupied as a place of worship. It belongs to the latter part of the Norman period, and is of an oblong form, measuring about 72 ft. in length by 15 ft. in width. The original division of the chancel and nave is shown by a plain-plastered arch, supporting a small bellcot outside the roof. Considerable alterations have been made upon the original church and buildings erected abutting upon its walls, yet there are some Norman features remaining, especially portions of two doorways, one with a zigzag moulded arched head, filled in by a slab with lozenge-shaped ornaments upon the surface. A thick surface of rough-cast over the exterior prevented any further details from being traced, but, in some places where it had fallen off, the ashlar of the original walling appeared. The earth had also accumulated to a considerable height upon the walls, which led to the suggestion that if it was judiciously removed, and the walls c'eared of the roughcast and carefully pointed, the church would be rendered more comfortable, improved in its appearance, and would enable any of the old architectural features that may still remain to be readily traced. Notwithstanding these drawbacks, the church has a venerable appearance, surrounded by lofty old trees, laden with exuberant foliage. The interior, as already noticed, is of an oblong form; the pulpit, being placed about the middle of the side wall, has a deep recess in front of it. Although the paving is of plain pine, the pulpit enclosing the rail of the Kirk Session seat, and the finishings of the Hopetoun Gallery, are of oak. The panelling of the pulpit and canopy above are neatly executed. The inclosure of the Kirk Session seat may have been the remains of the altar-rail when the church was used as an episcopal place of worship. It consists of a large base with massive balusters, connected at the top by small arches, which support a broad moulded cope. There is some very effective carving upon the Hopetoun Gallery, which, with the fittings described, appear to belong to the seventeenth century. A peculiar arrangement is connected with the Hopetoun Gallery. There is an outer lobby, from which the gallery and a retiring-room enter; from the retiring-room there is a small well-lighted chamber with a fireplace and an opening in the church wall, through which the preacher may be seen and heard; an invalid or other occupant may thus join in the services without being exposed to draughts or other inconvenience. This may be said to be an elaboration of the earlier hagioscope. In the lobby there is also the shaft of an ancient Celtic cross, which was discovered in 1841 when removing an out-building attached to the church. It is now carefully cleaned and set up, and also suggests the course to be followed should any similar objects be discovered. In the churchyard there is a long gravestone of triangular section, with a longitudinal rising curve, turned up slightly at the ends, and finished upon the sides with rows of overlapping scales. Similar stones exist in other parts of Scotland, and also in England. They have been suggested to be of Scandinavian origin, but the form appears rather to have been suggested from the covering of the ancient bier, and which ultimately developed into the ridged Mediæval cope-stone.

The next place visited was Hopetoun House, which was occupied, but the party were kindly shown round the exterior. It is a magnificent palatial building in the Italian style, consisting of a centre and wings extending forward. The centre was erected about 1700 from a design by Sir William Bruce, the architect for the restoration of Holyrood Palace, and the wings were added in the end of last century from designs by William Adam, father of Robert Adam. The gardens are extensive and well arranged. On leaving, attention was directed to several large and interesting specimens of pine trees, and to the remains of the ancient castle of Abercorn, which was taken and demolished by James II. in 1455, during the Douglas wars.

After partaking of a substantial dinner at the Old Hawes Inn, in South Queensferry, the time remaining was devoted to a short visit to the Norman Parish Church of Dalmeny, of unknown date, but the name of the parson appears as a witness to a charter about the middle of the twelfth century. All then returned home highly gratified with the day's excursion and the admirable arrangements made by their President.

HAMMERWOOD CHURCH, EAST GRINSTEAD, SUSSEX.

THIS building is the church of a new parish, which has been formed, for the most part, from an outlying portion of the large parish of East Grinstead, from which it is fully four miles distant. It stands on high ground, and is a very conspicuous object in this still well-wooded district.

The name "Hammerwood" is derived from one of the old iron forges which were once so prevalent in the Weald of Sussex, and the stream in the valley below the church still retains the dam and mill-stream which doubtless once did duty for driving the forge. This water has long since been formed into an ornamental adjunct to the adjacent mansion.

The church, which is in the English flowing Gothic style of the middle of the fourteenth century (the Decorated), consists of an open nave, divided from the south aisle by a range of arches with circular columns and carved capitals. The chancel opens from the church by an ornamental arch of its whole width. The tower, with spire, is at the east end of the south aisle, and opens into the chancel and aisle by two corresponding arches. The vestry is on the north side of the chancel, and there are two porches north and south of the church.

The whole of the roofs are of open timbering, with arched principals; the seats are of open oak framing, and oak has been freely used for the fittings generally. The passages are paved with tiles, and the windows are filled in with ornamental glazing, by Mr. Brunton, of Kennington. The roofs are covered externally with Broseley tiles. There is a peal of five bells in the tower, which were supplied by Messrs. Warner, of Cripplegate.

The carving has been done by Mr. Davis, and the heating apparatus by Messrs. Berry, of Pimlico. The contract for the erection of the building has been successfully carried out by Messrs. Nightingale (builders), of Reigate, from the design and under the superintendence of the architect, Mr. E. P. Loftus Brock, F.S.A., of Montague-place, Russell-square.

The church has been erected by Mr. Oswald A. Smith, of Hammerwood Lodge and Lombard-street, who has defrayed the whole cost of the building, besides giving the site.

The large east and west windows are filled in with stained glass, by Messrs. Clayton & Bell.

The length of the building from east to west is 78 ft. The spire is 100 ft. high.

The churchyard is enclosed by a stone wall, and is entered by a lych-gate of massive oak work.

DECORATIVE DESIGNS.

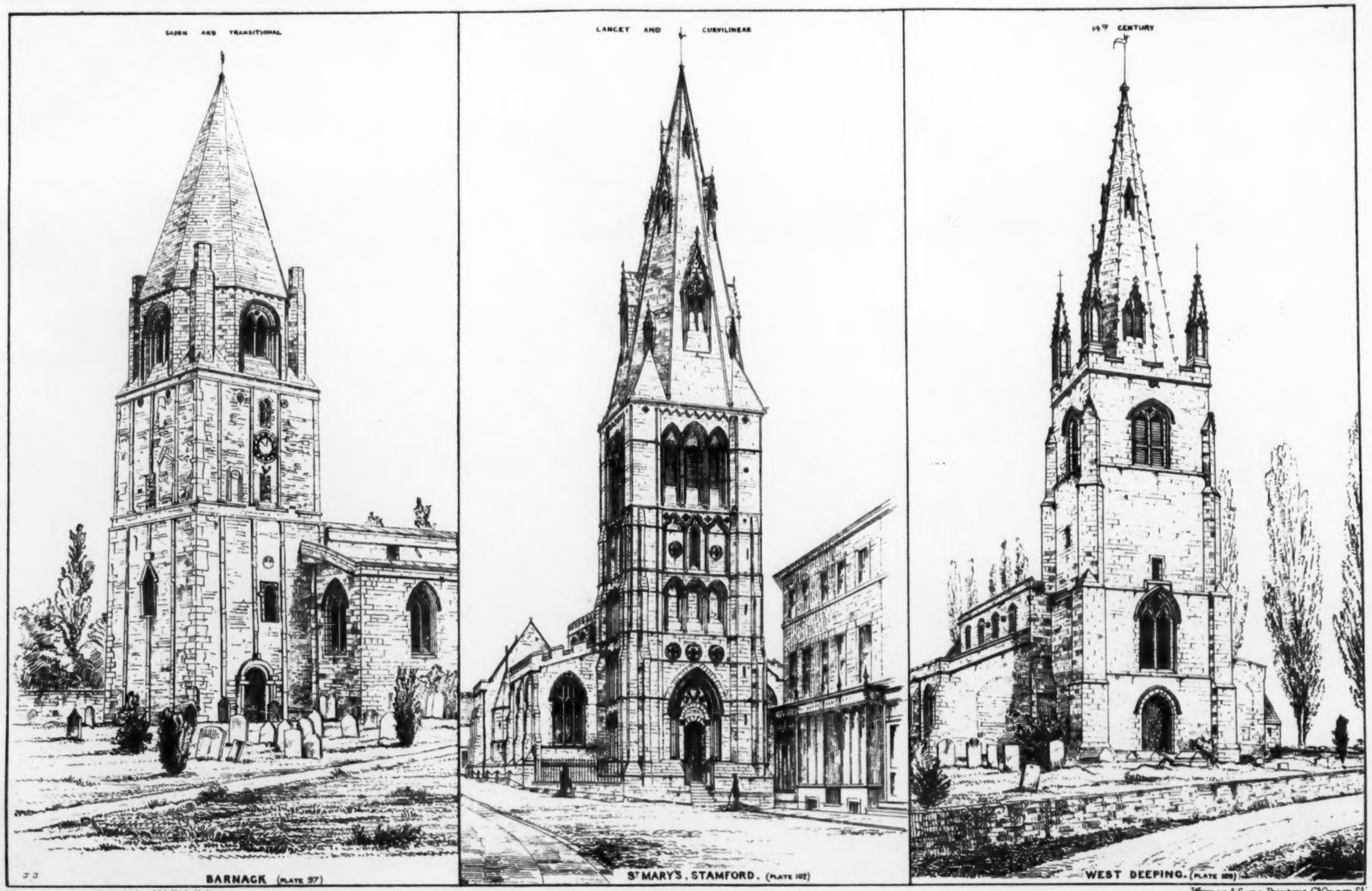
THE accompanying design by Mr. Geo. C. Haite for wall-paper is the first of a practical series, illustrating various decorative arts and art-manufactures, which will appear from time to time in the *Builder*. The drawings will be reduced by photo-lithography. All the examples given will be strictly original and of a thoroughly practical kind, especially adapted to the purpose for which they are intended.

The departments it is hoped to illustrate will include wall decoration in its diverse forms, as paper, leather, wood, fabrics, matting, tiles and terra-cotta; ceiling decoration in flat and relief, stencilling and painting; the decoration of furniture, as painting and inlay carving; the treatment of floors in parquetry, wood, tiles, fabrics, linoleum, together with suggestive designs suitable for iron, brass, stone, glass, and other materials.

Whiteman & Bass *Photo-Litho*

WALL PAPER.—By George Chas. Haite.

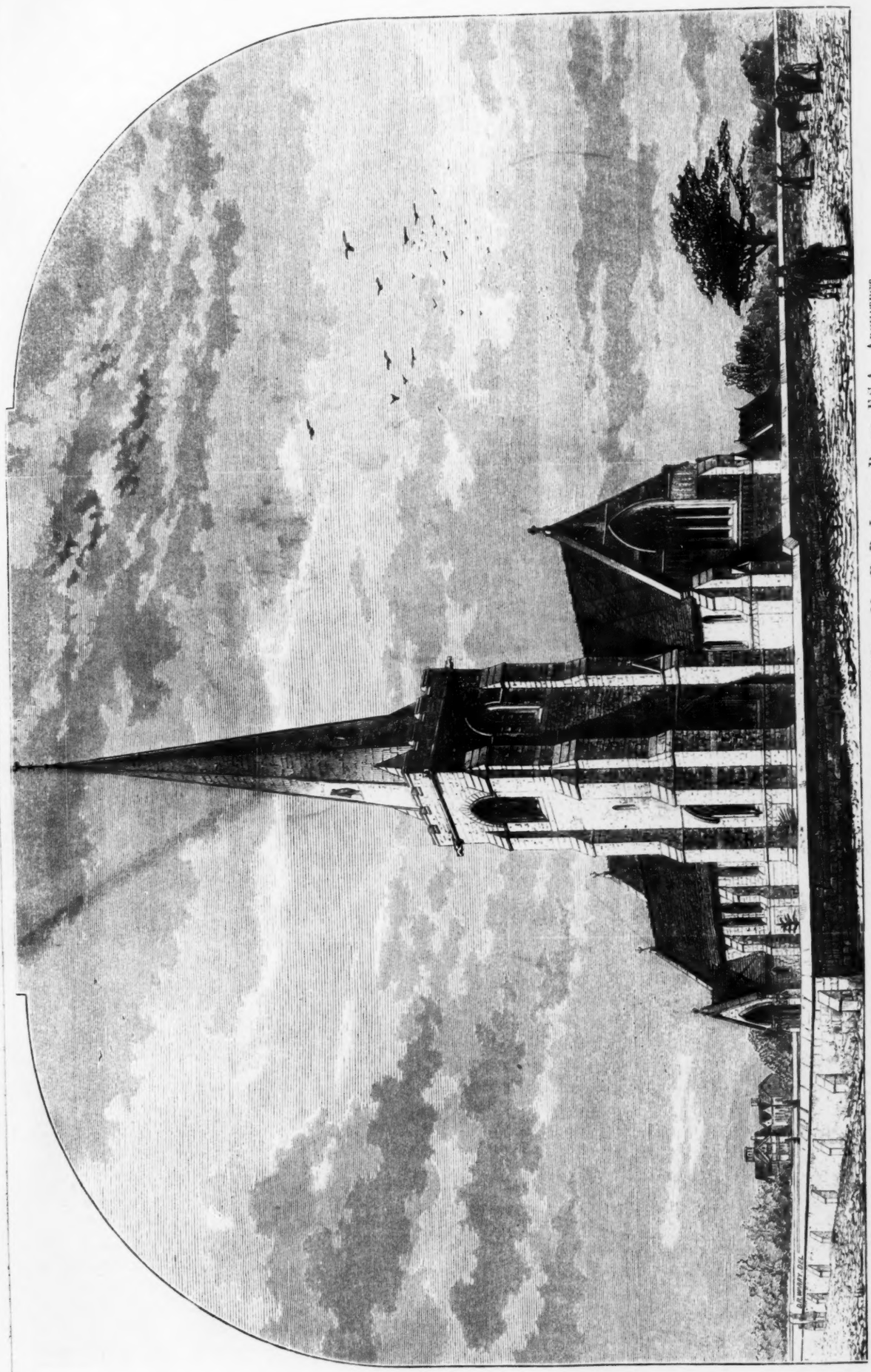
Wyman & Sons, Printers.



Whiteman & Bass, *Photo-Litho* 236, High Holborn.

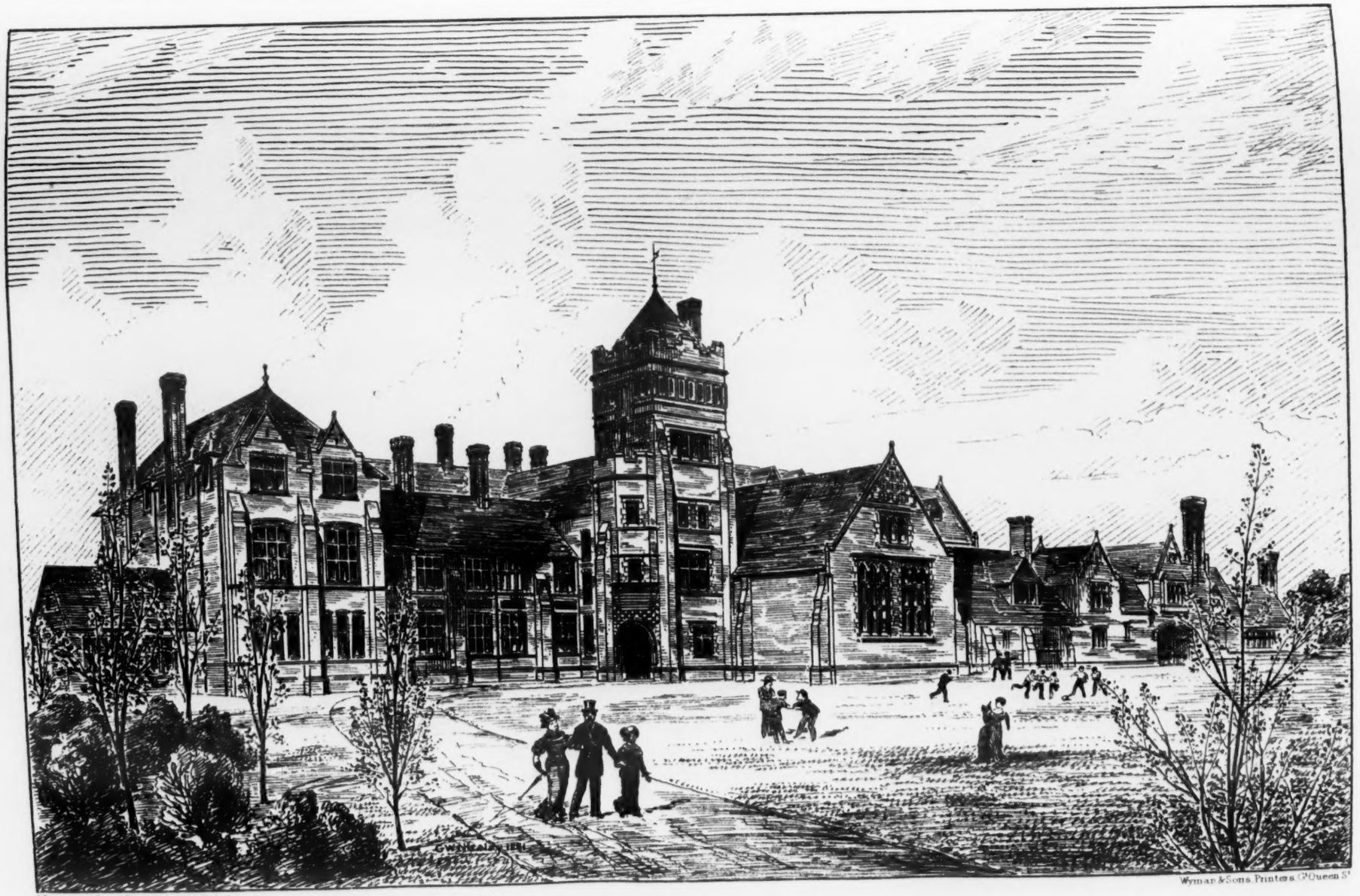
Wyman & Sons, Printers, 74 Queen St.

TOWERS AND SPIRES IN AND NEAR STAMFORD.



HAMMERWOOD CHURCH, EAST GRINSTEAD, SUSSEX.—MR. E. P. LOFTUS BROCK, F.S.A., ARCHITECT.

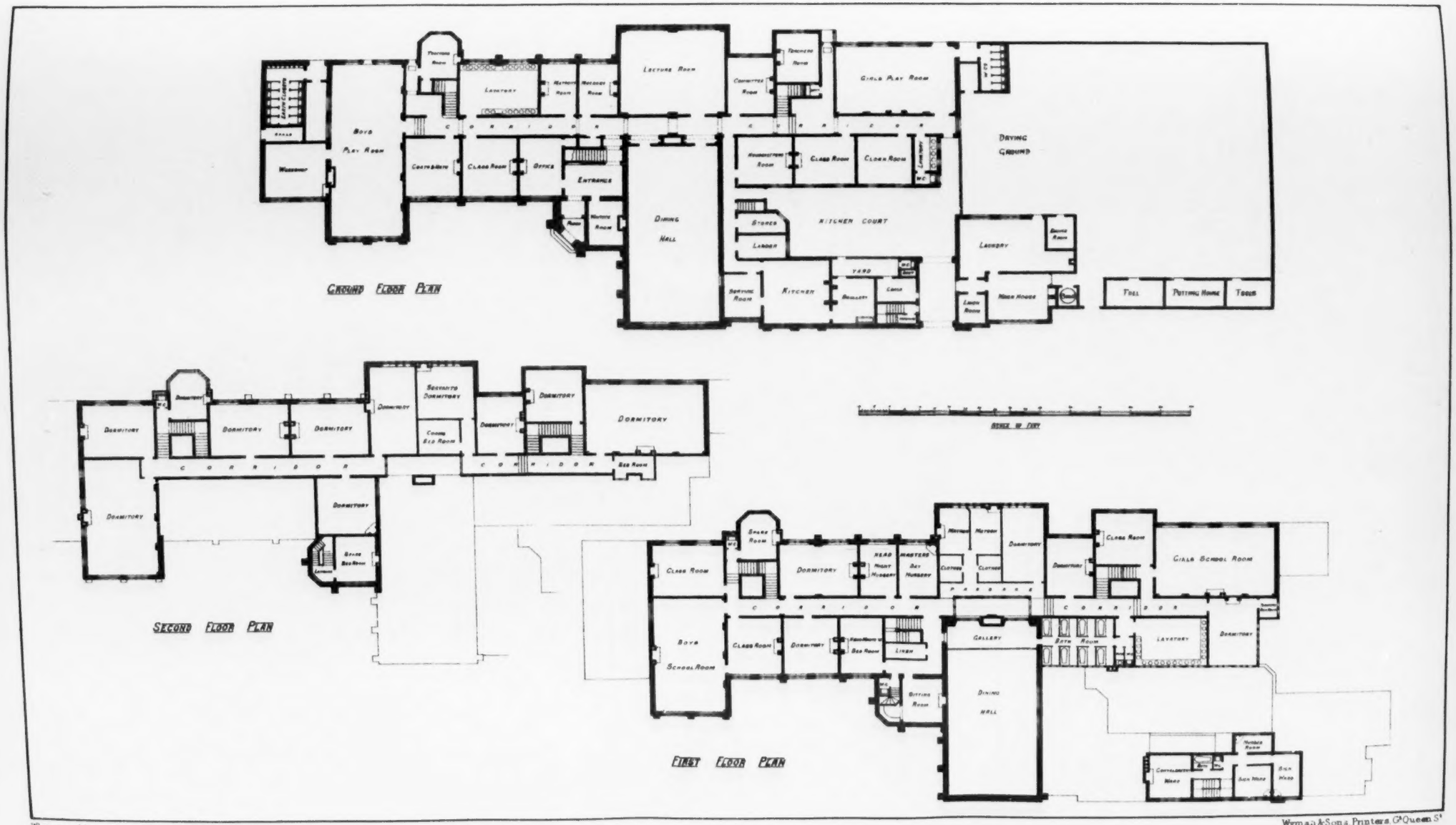
CHURCH OF THE "STIFT HAUG," WÜRZBURG: SEVENTEENTH CENTURY.



Whiteman & Bass, *Photo-Litho*, 236 High Holborn

Wyman & Sons, Printers, 74 Queen St

NEW SCHOOLS, SAFFRON WALDEN.—Mr. Edward Burgess, Architect.



Whiteman & Bass *Photo-Litho* 236, High Holborn

Wyman & Sons, Printers, 74 Queen St.

NEW SCHOOLS AT SAFFRON WALDEN, FOR THE SOCIETY OF FRIENDS.

Such a series will, we believe, supply a want. Patterns already executed and shown as such are of little or no value to manufacturers and professional men who respect *meum et tuum*. Moreover, manufacturers themselves, as a rule, object to the publication of their patterns, since it lays them open to the safe attack of plagiarists and to a certain extent encourages the production of inferior and cheaper imitations, which are thrown upon the market to the detriment of the better class of goods.

The designer will in each case endeavour to explain in a concise form the scheme of colour, the manner of production, and his reasons for the construction and selection of the design whenever it may be necessary.

A WALL PAPER.

This design is intended for the decoration of wall space, and repeats in 21 in. by 21 in., and drops in the hanging, the necessity for which will be at once apparent. The subjects selected are the common nut and sloe, and from their treatment rely almost entirely upon colour for effect; therefore it loses considerably in reproduction in single colour. The scheme of colour is more elaborate than is generally advocated for printed papers, numbering, as it does, in all six colours; but in this pattern, if they are kept well together, the soft and rich glow produced by their means will not at all lessen its decorative value.

The following arrangement of colour is suggested:—Divided into oblong squares of two shades of a well-broken yellow, the darker falling behind the nut, which the designer has endeavoured to convey by dots; one quiet green series for the leafage, a sufficient difference appearing in the nut leaf where the veining is more open; a pale greenish white for nut; dull bluish purple for the sloe; the stems and nut husk in citron; the whole being brought together by an outline of dull brown, which serves for the veining also.

CHURCHES IN AND NEAR STAMFORD.

WE noticed at length in our last number (vol. xl., p. 783) the recently-published book which deals in a very good way with the "Churches of the Nene Valley" (Batsford, 52, High Holborn, 1880), and of a district a little to the north of it. A promise was made that three of the perspective views should be reduced by photo-lithography so as to make up a page illustration for the *Builder*. The perspective views in the book are in number about one-sixth of the 112,—the whole number of the plates,—and are slightly out of the way of the main purpose of the volume, which was to concern itself with the interiors of buildings and with details, rather than with outside and general effect. A few illustrations of exteriors, however, find their place naturally enough,—since they also show what changes in expression and in details were being made between a period well before the Norman Conquest, and the middle of the fifteenth century. The original lithographed illustrations are very fair specimens of transfer lithography. They have been reduced for us to about half their original size in every direction, but still show good draughtsmanship and a light firm touch. The three examples have been selected as being fairly characteristic in their way. Although the intervals between the dates of the work are not even, there is a fair representation of several of the stages between the primitive Romanesque of the very early tower of Barnack and the late Curvilinear work at West Deeping. Of work belonging to intermediate dates, for instance, is the octagon belfry-stage and short stone spire, belonging to the latter half of the twelfth century, put upon and cleverly designed to suit the rude square early tower of Barnack. This view (plate 97) and that of the still more characteristic tower of Earl's Barton (plate 96), will give the possessors of this volume a very good idea of the work which our rude forefathers contrived to erect amid all their difficulties. The west tower and spire of St. Mary's, Stamford, take very high rank among the many west towers and spires of a good stamp scattered liberally over England. The tower is by no means the distinctive fifteenth-century Stamford tower,—appearing at St. John's, St. Martin's, and All Saints',—which will be found carefully described in vol. xxxvii. (1879) of the *Builder* (pp. 692, 693). St. John's is given in the "Nene Valley" book (plate 112). That treatment of the towers came into vogue long after the completion of St. Mary's spire. This spire fits the substructure very well in scale and extent of elaboration; but the tower is much pierced from the base upwards, and the spire has imposed a difficult task upon it for more than 500 years. The extra weight has not been at all easily borne, and buildings-up of windows and arches, iron bands and ties, &c., have been pretty freely indulged in. Through the "wisdom of our ancestors," in the days sighed after as those of rare constructive skill and of honest building, plenty of these little tasks have fallen to the lot of us poor worshippers of the past in these degenerate days.

NEW SCHOOLS, SAFFRON WALDEN.

THE schools we here illustrate by view and plan have been recently erected from the designs and under the superintendence of Mr. Edward Burgess, architect. The building will accommodate 200 children.

The materials used are red brick, with terra-cotta dressings; and tiles on the roofs.

The builders were Messrs. Bell & Sons, of Saffron Walden.

THE CHURCH OF THE "STIFT HAUG," WÜRZBURG.

As we have more than once pointed out, although the Renaissance style was introduced into Germany at the end of the fifteenth century,* yet it was two centuries before it came into anything like general use in the construction of churches. The earlier ecclesiastical edifices erected in this style in Germany are, as a rule, very dignified, and rather severe in character, and possess considerably more picturesqueness of treatment than those of Italy or France. The high-pitched roof and projecting external buttresses of the Gothic are still retained in combination with regular Italian domes and façades. The curious bulb-shaped spire, consisting of a series of lanterns superimposed, and each crowned by an onion-shaped dome, is a remarkable feature of these buildings, and although it may be objected that these spires are unconstructional and eccentric, there can be no doubt that they have a remarkably picturesque appearance, especially when seen in combination with other buildings.

The Church of the "Stift Haug," at Würzburg, is an interesting example of this style, and exhibits all the peculiarities of that particular phase of architecture which we have been describing. The name "Stift Haug" really means "the Establishment of Haug," and is the designation given to a college of priests, of which this was the church. The church itself is dedicated to St. John the Baptist, and was erected between the years 1670 and 1683, under an architect named Petrini, a native of Würzburg, who erected many buildings in that town. The name Petrini certainly has a very Italian sound about it, but Italian names are so common in Würzburg, even at the present day, that it is probable that an Italian colony was established here some centuries back.

The Church of the Stift Haug consists of a single choir, terminating in a polygonal apse to the east; transepts; and a nave of three bays, with chapels instead of aisles. A finely-proportioned dome rises over the intersection, and two lofty towers, crowned by bulb-shaped spires, flank the western façade.

The interior of the building is simple and dignified, and the altars and furniture are in better taste than is usual with buildings of this date, while the organ is really a fine piece of design. The pendentives of the domes rest upon a series of pilasters rather singularly treated.

The church is built of a fine warm sandstone, except some of the plainer portions of the walls, which are of rubble covered with plaster. The apse has rather a Romanesque character about it, and were it not that there is positive evidence to the contrary, one would be led to suppose that remains of an earlier church had been worked into the existing building.

The architect Petrini also erected the magnificent tower of the University Church, the "Julius Hospital," the city gates, and a portion of the castle at Würzburg. All his works have a fine picturesque outline, and the detail is bold and effective, though rather coarse.

* The "Coronation Hall" in the Hradschin at Prague, which dates from the years 1470–1520, is said to be the earliest building exhibiting Renaissance detail in Germany.

ARTISANS' DWELLINGS IN LARGE TOWNS.

FROM A NURSE'S POINT OF VIEW.*

ANY one who knows anything of the condition of the working-classes in the back streets and slums of London and other large cities, does not require to be told that rules of nursing in their entirety cannot be carried out. It is impossible to choose a quiet room with the aspect you would most desire for an invalid, for there is only the one living-room for father, mother, and four or five children. The walls are neither painted nor whitewashed, but "covered with a dirty cheap paper, pasted over innumerable other papers, harbouring loathsome insects," so that on summer nights the poor are often driven from their feverish unrest to seek relief in the streets and sit on the doorsteps, or propped against the wall of the houses until sleep and fatigue again drive them in. The ceilings are only whitewashed at long intervals of years. The grate is what used to be termed a "bed-room grate," one of the most useless for cooking purposes. The window,—there are rarely two,—does not open at the top, or else it opens without a sash-line, so that it must run down to the wooden support when open, or be closed. There are no means of heating water, except by the kettle, which then takes the whole of the fire; no oven for warming or baking any invalid's luxury; no place to keep milk without its turning sour; no water supply,—except the one water-butt, tap, or pump in the cellar or yard, which has to supply for drinking and all other purposes all the lodgers in the house. And it is a common thing in Holborn parishes for one house to contain ten families and between thirty and forty children. All water for cooking, drinking, and cleaning has to be carried up many flights of stairs in vessels so unfitted for the purpose,—a gallon jar with small bottle-neck is the most common,—that the poor practise a more rigid economy with water than can be understood by those who have not themselves gone through the labour of bringing it up, and of carrying the dirty water down, many times in one day. So you will see the hands and faces of the children washed in the same water, and the same soiled water reserved for washing the floor afterwards,—when that operation is gone through.

If this Domestic Economy Congress can carry out all the good they have at heart, we may hope that in the next century tenants will not be found for such lodgings. But in the present day, as has been well said, "working men cannot build their own houses, but must use those that are available. . . . The result being that they are driven into over-crowded courts and ruined tenements," where ventilation and cleanliness, in a nurse's sense, are almost unknown.

The books on Domestic Economy used in schools, that I have seen, are all more or less admirable in their remarks on "nursing the sick," as they are taken from Miss Nightingale's "Notes on Nursing." They give advice on the choice of a sick-room, quiet, pure air, cleanliness, warmth, rest, diet, light, and cheerfulness. Short directions are also given with regard to food, drink, disinfecting, and the qualities necessary in a good nurse. But in none of these books, nor in the schools where they are used, has it been thought necessary to teach nursing like cooking, by demonstration and practice lessons. But we have to remember that children leave school at thirteen, and that a large proportion of them go out to "a little place," where there is no chance of their ever being trained in the service of cleaning "a sick room" and furniture, and of making the bed and changing the linen of a helpless patient.

I would suggest that if nursing is to be one of the subjects for examination according to the New Code, the art of nursing and of keeping a patient clean and free from bed-sores should be taught to the children first by demonstration, and then by practice lessons. I have myself taught quite young children to change the linen, and make the beds of helpless patients,—each child taking it in turns to be the patient, and doing her best to be in such a "helpless condition" that the two children acting as nurses might not have too easy a task in "changing her," as the removal of one set of bed and personal linen for another is termed. In the same way, I and the ladies working under me, as trained nurses

* A paper by Mrs. Dacre Craven, read by her at the Domestic Economy Congress, Royal Albert Hall, on the 23rd ult.

for the sick poor, have taught children how to use certain appliances for the sick, how to clean a carpet,—if too large to admit of removal,—without dust or noise, by means of a wet cloth, twisted round the brush, or itself made into one; how to clean the hearth, to lay and light a fire; and, to elder children, how to wash a patient from head to foot, between blankets or their substitute, without once uncovering any part of the body, and without any unnecessary amount of water. But if, as an old nurse who has given the best part of her life to learning her profession, I may be allowed to give an opinion, I do not think that lectures or books can ever give this teaching.

Again, with regard to ventilation, it must be remembered that the artisan class in London is a moving body. Every clergyman will tell you of the difficulty he has to encounter from his parishioners constantly moving from one district or parish to another. It is, therefore, useless to recommend ventilating valves, &c., which could not without too great expense be removed from one lodging to another. The only ventilation practicable for the working-classes in lodgings is natural ventilation,—that is, ventilation caused by the ascent of heated air and the descent of cold. Architects, as a rule, made no provision in former days,—they rarely do now!—for the air which is to feed the chimney. An ordinary fire, as you all know, draws about 150 cubic feet of air per minute, and in the absence of any provision for the admission of air, and with the window shut, the supply of air must come from irregular sources, viz., from window chinks, through the keyhole and crevices in the door-stead, skirting-boards, and floor-boards,—these irregular streams of cold air passing for the most part horizontally towards the fire, and chilling the occupants of the room not in bed. The more furnace-like the fire the stronger the cold draught, but a very moderate opening in the window will stop all irregular draughts, the air taking the easiest course. By holding a candle at the keyhole of a door you can test whether sufficient air is admitted by the window; for, if so, the flame will burn in repose, and the horizontal draught can be converted into a vertical one by a board or cloth, 6 in. or 8 in. high, fixed about 2 in. from the window.* I think children might be taught this, and also the Canadian system of ventilation, where windows will not open at the top, of opening the lower sash and filling up the space (temporarily) with a folded towel or cloth, until a piece of wood could be made to fit well in under the lower sash, thus allowing a supply of air to come in between the two sashes without causing a draught or strong current of air to blow down upon any one near the window. They should also be taught that it will keep a room fresher and cooler, even in hot weather, to have a very small fire burning in the grate, or a lamp, so as to keep the air from stagnating by making a current of air towards the chimney. They could be taught by demonstration how to make "outside blinds" with the common window-blind, two sticks, and some tapes, so that cooled air could enter the hot rooms in crowded courts and alleys. We have found the sick most grateful for this in St. Giles's and Holborn.

Children might also be taught how to "ice milk," soda water, or any cooling drink for the sick, by wrapping the vessel containing it in a wet flannel and standing it in the sun; how to filter the foulest water by means of a common flower-pot with a piece of sponge in the hole at the bottom and two inches of charcoal over it, and then two inches of clean sand,—the pot to be placed over whatever vessel is to contain the water when filtered; how to wash and dress a baby—by means of a china doll; and how to give a warm bath to a child with croup. In the books of instruction, it is always said "Give a warm bath immediately," but in not one instance are instructions given that no baby or child should be put into a bath which is too warm for your bared elbow to feel comfortable! nor how, when the child is in the bath, boiling water may be gradually added by keeping the water in the bath always moving with one hand until its temperature has been raised to over 100° without the slightest pain or inconvenience to the child.† Children might further be taught that on coming out of such a bath, a warmed blanket should be thrown round the baby; that he should be put to bed and covered with extra blankets to encourage free perspiration, for an hour at the least, and then thoroughly dried and dressed as usual for bed. All children, moreover, ought to be instructed practically how to drop oil into the ear to get things out; and, theoretically, such simple things as bathing the eyes with vinegar to nullify the effects of quick lime, and so preserve sight, which would be lost before surgical aid could be found. But to teach children how to diagnose diseases and how to treat them, is to multiply the already large number of women who think that "quack doctoring" is nursing.

In conclusion, I would again urge that nursing, like cookery and cutting-out in needlework, should be taught practically, and that means should be devised for giving special instruction in these subjects to elder girls in night-schools.

* Mr. F. Hinckes Bird, on "Costless Ventilation," *Builder*, 1862; Mr. T. Pridgin Teale, on "Dangers to Health," 1878.

† I know of two instances, one quite recently, where children have been scalded to death from ignorance of "how to give a hot bath."

AN ITALIAN EXPORTER.

AT the banquet given last month to the exhibitors in the National Exhibition in Milan, the one who claimed most attention was he who, as the Syndic Berlinzahi termed him, was "the typical man of modern times,"—he who should be the model and beacon of national labour for exportation, — the Commendatore Francesco Cirio, of Turin.

At the Exhibition of Milan he is to be found as the exhibitor of preserved food of all kinds, shown in a monster pavilion, with two others adjacent, of all kinds of milk produce and eggs. Then in the gallery where all comestibles are found,—in the department of materials for building purposes, among the machinery, and even among railway works, with his refrigerator wagon, after the American Teffney system, corrected and perfected to meet the especial exigencies of exportation from Italy of alimentary merchandise.

This extraordinary commercial enterprise of exporting alimentary productions from Italy is not more than ten years old. Signor Cirio was before 1869 an *employé* on the North Italian Railway, and is by birth a Piedmontese,—the people of Italy who possess the quality of perseverance and industry in the highest degree. In December, 1869, Cirio sent off from Naples his first large wagonful of cauliflowers,—the first time any exportation of Italian vegetables had ever crossed the Italian frontier; in 1870, a few wagon-loads of vegetables; in 1871, sixty wagon-loads, containing, 3,655 quintals, exclusively of vegetables; in 1880, 4,519, with a load of 386,903 quintals. The medinm of the load of each wagon in 1871 was six tons; in 1880, nine tons.

From 1870, Cirio had carried out all his plans alone, uninterrupted by any opposition; but by 1880 he had to battle against all the opposition and hostilities always attending successful speculations; but to his own personal activity, perseverance, and indomitable courage is he indebted for the grand success attending all his operations. Every fourth year a new impulse and development of his plan were seen. In 1871-72 he confined himself to the exporting of vegetables to Austria, Hungary, and Russia. In 1873-74 he began exporting fruits, first in small proportions (twenty-five wagons in all), not only to the above countries, but to Holland, Belgium, and England. In 1876 he undertook to export eggs and butter; and from 631 wagons sent in 1875, he, in 1876, reached the number of 1,188, with a load of 18,000 tons weight. In 1877 he began to send to France, beginning with the exportation of fresh fish, especially trout, taken from the Italian lakes. The price of the lake trout quadrupled, and many, following his example, drove flourishing trades in fish exportation.

Independently of these operations, the expediting of butter and cheese from Lombardy, &c., was carried on with great vigour. In this several influential men from Verona and other places joined him, forming a large company. At the commencement the introducing Italian eggs into the English markets met with great opposition; but by degrees the difficulties were overcome, and now one house alone in London employs 120 horses to distribute Italian eggs in the various parts of the metropolis.

By the exporting of eggs, fowls, and pigeons, Cirio has given an impulse to a modern branch of domestic industry, the development of fowl culture, by which the small farmer can benefit greatly, and secure therefrom a moderate annuity. The cultivation of vegetables and improvement also has been stimulated, and he himself has, at great expense and against great opposition, possessed himself of lands where he has given example of the possibility of improving the vegetables and fruit by introducing all the modern suggestions and means used by other countries.

Another of the branches of commerce undertaken by Cirio & Co. is the preserving of fruits and vegetables, which is carried on to a perfection hitherto unknown. For the preserving of fruit Cirio has set up an immense establishment at Turin, where, besides vegetables and fruit, fowls in jelly, and, above all, the truffles, are famed for the preservation of their exquisite taste.

In Rome, Cirio has formed a company for exporting Roman cement, and by means known to himself, he has been able to export ten tons of cement in a form that when required for use, by mixing it with nine parts more of common sand, the same effect is produced as by the pure Roman cement, thus saving the expenditure of carriage.

SOCIETY FOR THE PROTECTION OF ANCIENT BUILDINGS.

THE fourth annual meeting of this Society was held on Friday, the 24th ult., at the Westminster Palace Hotel, his Excellency the Hon. J. Russell Lowell, the American Minister, in the chair. There was a large attendance.

Mr. Newman Marks, the secretary, said that letters expressive of inability to attend the meeting had been received from (amongst many others) Mr. James Parker, the Marquis of Salisbury, Professor Robertson Smith, Sir John Lubbock, Mr. Alma Tadema, R.A., Mr. H. Stacey Marks, R.A., the Rev. Canon Greenwell, Dr. Birdwood (of the India Office), and Mr. Samuel Huggins. Mr. Huggins wrote:—

"I am pleased to find that the United States, by her Minister, is to take so prominent a part in the proceedings, which will have a good effect on the British mind, as it tells a tale of the association, in the American mind, of 'Fatherland' with ancient edifices, which I believe is general among the cultivated classes. I remember the bitter disappointment always manifested, as I was credibly informed, by American visitors to Chester during the restoration of the cathedral, and their invariable charge to the *cicerone*, 'Don't let them touch the cloisters!' (the feature of the cathedral generally considered the most beautiful)."

The Chairman, in opening the proceedings, said it was not an English characteristic to shift the burden of responsibility upon other shoulders, nor had that been the method by which the English race had achieved such an eminence,—he was almost going to say pre-eminence, — in the world. He had almost imagined, however, that some such desire had manifested itself when he was asked to preside over a meeting for the conservation of ancient buildings,—and primarily, he supposed, for the conservation of ancient buildings in England. If that had happened in an age when inanimate things still possessed the gift of speech,—in an age when Imagination still sat by every chimney-corner and played a leading part in the tragi-comedy of life,—he should have expected to hear addressed to him words something like these proceeding from the walls of the old buildings,—"What have *you* to do with *us*?—You, a man of the New World,—a child of Yesterday, even though you flatter yourself that you are going to be the father of To-morrow,—you, who congratulate yourself on having cast off the burden of Antiquity, and on having liberated yourself from the mortmain of the Past,—what have you to do with us?" His venerable friend, in thus appealing to him, would recall to his mind a little adventure he once met with while walking out of Boston, in New England. The road was covered with ice and snow, and a little boy had fallen down, and began to cry. He went forward to commiserate with the child, who, as soon as he heard his voice, said, suppressing his tears, "Well, and if I am hurt, it is not any of your business!" He confessed that seemed to be a thoroughly English answer,—an answer quite characteristic of a race of people who set a higher value upon an ounce of pluck than upon a hundredweight of sentiment; but at the same time it showed that in whatever else a people changed if they went beyond the sea, they did not change their blood, still less did they change in those mysterious influences drawn from a remote source which kept alive the characteristics of race. He felt that the little Boston boy of whom he had spoken, and

illions of others like him, had a claim to their are of the achievements of the English race, d accordingly he did not feel that he was out place in presiding over the meeting. Strong were the ties of blood and language, those of adition were still stronger. Americans and all ther English-speaking peoples looked upon ngland not only as their metropolis in the old nse of the word, but they looked upon it as eir muniment-room, where were preserved the rchives of the race,—whether on parchment or aper, or whether recorded in stone. The ncient buildings of England were as much the rchives of the Americans and of the whole nglish-speaking race as they were those of ngland herself, and he was proud to be able o say that a countryman of his had so thoroughly tudied those archives as to have become the est archæologist and genealogist now in ngland: he referred, of course, to Colonel hester, on whom he was glad to see that the niversity of Oxford had just conferred honour. merica had contributed directly on more than ne occasion towards the conservation of nglish monuments, and on other occasions he had contributed indirectly to the same nd. As an instance of such indirect contriutions he referred to the case of the house in hich Shakspeare was supposed to have been orn, and as to which nothing but the fear hat the enterprising Mr. Barnum would purhase the house and remove it to America terrified the English people into subscribing 3,000*l.* or the purchase of the house and its preservation. The American people had naturally a very irect interest in the question of the protection nd preservation of the ancient buildings of ngland, and if they were not themselves distinguished for their beautiful monuments, that was all the more reason why they should devote ll their energies to the preservation of beautiful monuments that had been built by other people. They protested against the restoration of old buildings because the hand of the restorer was far more destructive than that of decay. He was not sure that he could go so far as those enthusiasts who would rather that an ancient building should tumble down and become a mass of ruins than allow anything to be done to preserve it. But it was possible to keep a true mean course between effacing restoration on the one hand, and destructive neglect on the other. The title of the society was, he thought, exceedingly well chosen as expressive of its objects, and those who supported it and carried it on had the sympathy and moral support (and he thought, if need be, they might count upon the material help) of every cultivated man on the other side of the water. It afforded him great pleasure to preside over the meeting and to do anything he could to forward its objects.

Mr. William Morris then read the fourth annual report of the committee, which commences with the following paragraph:—

"The Committee have been steadily at work at the business of the Society since we last met together; they do not doubt that its principles are being more and more accepted; but the fact must be faced, that ignorance and thoughtlessness are so busy, and are so entirely unchecked by any more direct influence than that opinion of cultivated men of which they know little or for which they care little, that the destruction of the art and history of our ancient monuments is still going on with terrible swiftness, both in this country and elsewhere; and unless those who really care about the preservation of these treasures bestir themselves, and sacrifice some time and money to furthering a distinct agitation against restoration, it will not be long before there will be no ancient building which can be looked on by men of sense and knowledge without suspicion and discomfort; and very few which will be able to sustain a claim to be considered as ancient buildings at all. The very list of those buildings for whose protection the Society has interfered shows how swift the destruction is that is going on at one end of the line, while we are laboriously building up a public opinion at the other end."

The report went on to describe in detail the action which had been taken by the committee with regard to the proposed restoration or destruction of ancient structures. Reference was made to the proposed widening of Magdalen Bridge, Oxford,—a step which the committee assert to be wholly unnecessary as well as destructive of the beauty of the bridge; to the fall of the tower of St. John's Church, Chester, owing to "the neglect of the advice given by the committee" in reference to the building; to Wimborne Minster, Ashburnham House, and other buildings, some of them in Italy.

The Hon. Percy Wyndham, M.P., moved the adoption of the report.

Mr. Reginald Stuart Poole, in seconding the motion, urged the Society to make strenuous efforts to save the Arab monuments of Egypt from destruction. Those beautiful monuments were now being most cruelly despoiled. He was quite sure that Professor Maspero, who had succeeded the illustrious Mariette,—too soon taken from us,—would be most ready to receive the co-operation of Englishmen and Americans in saving the priceless Egyptian and Arab monuments under his jurisdiction. The Egyptian monuments were really documents of priceless value, and only now were they beginning to be understood. Very frequently the damage that was wrought by tourists and others rendered meaningless, and caused to be lost for ever, inscriptions possibly of the highest historical value. In the Arab monuments, on the other hand, was to be seen a sequence in the development of the style corresponding to the progressive changes in Gothic work. This art had never been properly studied, but it was capable of teaching us some valuable lessons in the way of decorative work.

Miss Amelia B. Edwards, in supporting the motion, described the destruction going on amongst the monuments of Egypt, not only at the hands of the *fellah* and the tourist, but at the hands of the *savant*. An army of destructive agents, moved by cupidity, by curiosity, by the mere spirit of mischief, and aided and abetted by a spirit of lazy utilitarianism, was doing its best to make a *tabula rasa* of the history of Egypt as contained in the monuments of the country. The pyramids were being used as quarries, and the paintings on the interior of the tombs were being damaged by the smoke and grease from the bunches of candles which were used as torches by the tourists,—who were the most destructive agents of all, many of them carving their names or initials with the view of going down to posterity in company with Rameses the Great and Thothmes III., or possibly, as a great authority had said, in order to show that a fool once passed that way, and did what mischief he could. Miss Edwards went on to urge that serious representations should be made to the Khédive with the view of securing better protection to the monuments of Egypt. The Khédive and his Ministers were very jealous of the good opinion of Europe, and it would not, she thought, be in vain if some serious remonstrance were made against the continuance of the destructive work that was now going on. She was sure that Professor Maspero would be glad to have his hands strengthened in the matter. He was very desirous of being able to effectually interpose against the Vandalism now going on. He would probably pay a visit to this country in August next, and it would, perhaps, be possible for the society to confer with him on the subject.

Professor Sheldon Amos also supported the motion, and confirmed the statements made by Mr. Stuart Poole and Miss Edwards as to the destruction now going on in Egypt.

The motion was unanimously adopted.

Mr. George Howard, M.P., moved the following resolution:—

"That this meeting, while strongly deprecating the practice of so-called restoration, feels deeply the necessity of urging on all guardians of ancient buildings the duty of keeping them in good and substantial repair, a duty which this Society has on so many occasions striven to put before them."

He said that while sympathising with all that had been said as to the monuments of foreign countries, it should not be forgotten that the society had an important duty to fulfil in this country. He lamented that the clergy, the universities, and the architects were against them, but it was their duty to press on the work they had undertaken, and not to be disheartened at only partial success so far.

Mr. C. Kegan Paul, in seconding the motion, said he hoped the society would keep its eye on Wimborne Minster, which had already suffered seriously by restoration.

Mr. William Morris supported the motion, and spoke with regret of the havoc that had been made by Balliol and other colleges in destroying ancient buildings in Oxford. After speaking in strong terms of the proposed modernisation of Magdalen Bridge, he concluded by complaining that the society was not so well supported pecuniarily, even by its professed friends, as he thought it should be, considering the importance and extent of its work.

The motion was adopted.

Lord Houghton, in moving a vote of thanks to the chairman, said he could not but feel that there was something touching in the circumstance of that meeting being presided over by a distinguished citizen of that great country against which the only thing that could be said was that it was not very old. He had heard Americans speak of the old Walls of Chester as almost revealing to them portions of the old story of Biblical history. Chester was the first walled town that they ever saw, and by its means they were able to realise more vividly than would otherwise be possible the Biblical stories of their childhood. He was sure that any injury to the Walls of Chester would be viewed as a national calamity in America. With regard to the general objects of the society, one reason, perhaps, why they were not better understood and why they evoked criticism, was that in many old buildings it was almost impossible to draw exactly the line of preservation so as to prevent decay, and, at the same time, to preserve to the building the totality of its interest. In conclusion, his lordship urged the formation of local committees or societies in connexion with the society.

The motion was seconded by the Hon. R. C. Grosvenor, and carried with much applause.

Mr. Russell Lowell, in acknowledging the compliment, said that, however much the political divisions of race might be separated, the historic continuity of the race would be maintained by the existence of its monuments. He considered no monument insignificant; none could be, because it might have some feature or some special circumstance connected with it, making it, as it were, a round of the ladder by which we could climb back to our historic past. The society was engaged in the performance of the office of a watch-dog, and it was of much less importance to know into how many calves the dog set his teeth, than that it should be known that there was a watch-dog on the premises.

SANITARY PLUMBING.

TRAPS AND TRAP VENTILATION (CONTINUED).

MR. HELLYER delivered the fourth* of the course of six lectures to working plumbers, undertaken by him under the auspices of the National Health Society, on Tuesday evening last, in the Hall of the Society of Arts. Mr. Noble Smith presided, and there seemed to be no abatement of the interest taken by the large audience in the lectures. The one now reported was illustrated by a large number of diagrams, and by practical experiments with traps of different forms made of glass so as to show whether they were or were not self-cleansing, and whether or not, under given conditions, they could be syphoned out. The lecturer was frequently stopped by questions which, while interrupting the course of his remarks, at any rate showed that the plumbers composing the audience were brimming over with a desire to learn, if not to criticise. The feeling seems to gain ground that an evening or two should be set apart for discussion of the subject at the close of the course of lectures.

Mr. Hellyer, in commencing his lecture, said that on that evening he ought, according to the programme laid down, to be entering on the discussion of the subject of "Soil-pipes and Waste-pipes," but he had been unable, in his last lecture, to exhaust the subject of traps. He had already considered the D-traps and bell-traps,—the two characteristic non-cleansing traps. There were many other traps which befouled themselves in use, but he only wished to speak of traps of that class which were used outside buildings, *i.e.*, in connexion with drains,—before passing on to consider self-cleansing traps. Some might think that such traps were outside of his subject, but in his opinion the plumber's knowledge ought to cover the whole area of house drainage, and ought certainly to extend to the sewer or cesspool. The first of the stoneware traps to which he would invite attention was the Mansergh trap, which, although only introduced within the last few years, had had an extensive sale, and was much liked by many. Nevertheless, he, the lecturer, condemned it,—firstly, he said, because it was non-cleansing; and secondly, because it did not leave the end of the waste-pipe discharging into it open to the atmosphere. It was not only non-cleansing, but dirt-holding; for in use it must form itself into a "collecting-box," as there were in it no fewer than eight corners in which filth could accumulate. No amount of water sent through such a trap could be made to scour the parts fouled. The bottom was flat, the sides

* For reports of previous lectures see the *Builder*, vol. xl., pp. 651, 711, 775.

were vertical; the partition dividing the two compartments was upright, and the area of the surface-water of the trap was several times greater than the inlet or outlet, so that the standing water of the trap, with its decomposing matter, could not get changed by any single flush, nor even by many flushes, sent through its inlet. The bad air from this body of contaminated water, if it did not escape through a waste-pipe into the house, would at times get in at the window or door when near it. The arrangement of the inlet was bad, as it water-locked the discharging end of the waste-pipe, instead of allowing it to be exposed to the atmosphere. There was another evil in connexion with that trap, viz., that the waste-pipe being trapped at its outlet end,—*i.e.* the remotest end of the pipe from the sink or fitting,—would expose the house to any bad air or decomposing matter left in the pipe. In a trap which he (the lecturer) designed some years ago for receiving waste-pipes and intercepting them from the drain, there were three dips or air-barriers, to prevent drain-air reaching the ends of any waste-pipes discharging into the waste-receiving compartment. Like the Mansergh trap, it had two separate bodies of water. It was specially constructed for receiving waste-pipes from baths and lavatories when the latter were fixed on bedroom floors, and for protecting them from the drains, which it most effectually did. The trap had two important advantages over the Mansergh-trap. First, it left the end of the waste-pipe discharging into it open to the atmosphere. Secondly, the bottom of the trap was rounded, and its configuration made it easier to cleanse. But that trap was not self-cleansing, or, at any rate, not so much so as he should like it to be, for an ordinary flush or flushes sent through it would not cleanse it. Now, when a trap could not be thoroughly cleansed, and the whole of the water standing in it changed, by a good flush of water sent into it through its waste-pipe, it ought never to be used, and so, though he held the patent for the trap of which he had last spoken, he condemned it. The well-known gully-trap was now being used for receiving waste-pipes from sinks, &c., but he did not wish plumbers to be "gulled" into its use for such purposes. It might be a good trap for catching *detritus*, and, therefore, just the trap to use in yards and streets for surface drainage, but as traps for receiving the discharges from waste-pipes were not wanted for catching (in the sense of holding) anything in the shape of decomposing matter, the gully-trap was not the right kind of trap for sink, urinal, or lavatory wastes. It formed a catch-pit for filth and decomposing matter, and no ordinary flushes of water sent into such a trap would cleanse it. There were other traps of a non-cleansing character for disconnecting waste-pipes from drains, but which he had no time to stop to examine, as he must hasten on to consider the much-used drain syphon for trapping off sewers. That trap, being a round-pipe trap, would be self-cleansing if it had no "manhole," and if it were provided with means for a waterfall into it. Never, or very rarely, was any pressure of water brought to bear upon the standing water of the trap, and, consequently the latter never got properly changed by a flush of water; while the man-hole or "inspection" hole was a collecting-place for filth. Another evil in connexion with this trap was its want of ventilation, *i.e.*, it had no provision, on its inlet side, for ventilating itself or the drain with which it might be connected. He had dwelt upon the non-cleansing class of traps and severely criticised them, because he considered that bad trapping meant bad drainage, —certainly good trapping was absolutely necessary to good drainage. If perfection in the sanitary arrangements of a house were desired, attention must be paid to every detail, for, however well planned the plumbing and drainage might be, it would not be sanitarily perfect with non-cleansing traps under the fittings inside the house, or with filth-collecting traps on the drains outside,—*i.e.*, round about,—the house. When foul matter was discharged into a trap, it should pass through it as dreams through the brain, leaving no substance behind. Certain traps, which he called self-cleansing traps, would do this. The principles on which such traps were constructed, and the conditions under which they should be fixed, were,—1. The trap should be free from all angles, corners, and places where filth could accumulate. 2. A free-way should be made for the discharges to pass through the trap without breaking their form, — *i.e.*, the traps should be like a round pipe, so made or bent as to form a water seal, thus ∩. 3. The body-part of the trap, for fixing in horizontal pipes or drains, should be smaller than its inlet, so as to hold as small a quantity of water as possible consistent with the position in which it was to be placed and with the work which it would have to do, and so as to admit of the water being changed every time a flush was sent through it. 4. The minimum-sized trap should be used, consistent with circumstances, but governed to some extent by the size of the waste-pipe or drain on which it was fixed and by the flush of water likely to be sent into it. 5. The water-way into a trap should be larger than its body-part, or than the waste-pipe with which its outlet might be connected, so as to be able to allow of efficient water flushes being sent through the trap to cleanse it and to cleanse its waste-pipe. 6. The inlet or mouth of the trap should always be so arranged that the water flushes should fall upon the standing water of the trap with a vertical pressure, so as to drive everything foreign out of the trap, and to entirely change its previous contents. 7. The *inlet* side of all traps fixed upon drains outside the house should be open to the atmosphere, so that any bad air rising from foul matter decomposing in the trap or coming through it from the drain or sewer might readily pass into the open air or be largely diluted with fresh air before passing into any waste-pipe, soil-pipe, or drain discharging into such traps. In cold countries, where the water standing in the trap would be liable to freeze in severe frosts, the mouth of the trap should be sealed over, and the foot-ventilation or air-induct should be taken into the waste-pipe, soil-pipe, or drain some little distance away from the standing water of the trap (to prevent the cold air currents playing upon it and freezing it). In this country, in sheltered places, there was little risk, and if the trap (for disconnecting waste-pipes, soil-pipes, or drains) was kept well down into the ground in exposed places, there was no danger from frosts, though in severe frosts it was as well to throw a little straw over the grating of such traps. He had only heard of one such drain-disconnecting trap being frozen during the last severe winter out of hundreds that he had had fixed, scores of them, from circumstances, having their standing water within 15 in. of the ground level. Having shown by ocular demonstration that round-pipe traps are self-cleansing, the lecturer showed that such traps were syphoning traps, and especially when they had long vertical legs attached to their outlets. They were often called "syphons," and were so, in fact, under given conditions. Unless syphonage could be prevented, such traps would not only be useless, but dangerous. Though the D-trap and the "Bower" trap were not syphoned with anything like the ease with which syphon-traps could be, they were by no means proof against the action of discharges through the pipes on which they were fixed. Syphonage of traps could easily be prevented by ventilating the traps. A great deal of ignorance prevailed on the subject of ventilation of pipes and traps, and that, too, among men who considered themselves sanitarians. Many of them simply ventilated the main waste or soil-pipe, but did not ventilate each individual trap. They insisted upon the soil-pipe being carried up full-size to the open air, and in some cases they were willing to give it foot-ventilation, but no stack of waste-pipe or soil-pipe was properly ventilated which was not exposed to the atmosphere at both ends, and which had not, in addition, each trap ventilated. Bends in air or ventilating pipes, when made full-bore, made but a trifling difference in the ventilating capacity of the pipes, and it was therefore better to let such air-pipes follow the lines of the building, to a reasonable extent, than to stick up a hideous straight pipe, like a scaffold-pole with struts to support it. The lecturer pointed out that Mr. Pridgin Teale, in his book on "Dangers to Health," though he showed some valuable improvements on old plumbing practices, recommended an arrangement of bath and other wastes by which the water could easily be syphoned out of some of the traps, which would thus be not only useless, but dangerous. Plate II. in that book showed such a faulty arrangement. Having referred to numerous other diagrams and made several experiments in illustration of his remarks, the lecturer, in concluding, observed that those of his hearers who desired to push their inquiries farther would doubtless have an opportunity of seeing and examining many traps and other appliances at the Medical and Sanitary Exhibition, which would be opened at Kensington in a week or two's time.

A hearty vote of thanks was given to the lecturer, and the Chairman announced that the specimens of plumbing work made by the workmen attending the lectures in competition for the prizes offered in connexion therewith would be exhibited at the Exhibition mentioned if sent in before the 12th of July.

The lecture was to be repeated this (Friday) evening, the 1st. The next lecture of the course will be delivered on the 14th inst.

THE SEWAGE QUESTION.

AT the ordinary meeting of the Sanitary Institute of Great Britain, held at 9, Conduit-street, on June 21st, Dr. A. Carpenter in the chair, a paper was read by Prof. W. H. Corfield, M.A., on the Present State of the Sewage Question.

After reviewing various systems, filtration through soil and wide irrigation were treated of at some length. Certainly the sewage had been satisfactorily purified, he said, in many cases, the conditions for satisfactory purification in winter being that the sewage should pass through the soil and not merely over it. Crops of all kinds had been grown by means of it, and in soil that would otherwise bear nothing; and the British Association's Sewage Committee had shown that as great a percentage of the manurial constituents had been utilised as was on an average utilised of the best commercial manure. Although, for various reasons, it had seldom been found to be remunerative, the reader adhered to his opinion formulated ten years ago that sewage irrigation would ultimately be remunerative in many instances, and that opinion was shared by the committee appointed by the Local Government Board in 1876 to inquire into modes of treating town sewage. An irrigation farm should be supplemented by a filter bed to receive and purify sewage when it is not wanted on the farm. The supposed dangers from the proximity of such farms, or from the spread of entozoic disease, were found to be purely imaginary; it was on the whole a better solution of the question for a large number of places than any other, and if, as was very likely, we had a series of dry years, its adoption would receive a great impulse. Where towns cannot make sewage utilisation pay, they must be content to be taxed to a slight extent to get rid of a most serious nuisance, and to secure a low death-rate.

SALES OF BUILDING LAND AT WALTHAMSTOW AND WALHAM-GREEN.

LAST week, Messrs. Protheroe & Morris offered for sale, at the Bakers' Arms, Lea Bridge-road, Walthamstow, eighty-three lots of freehold building land, being part of the Boundary-road estate. Several plots, having frontages of 15 ft. to the Boundary-road, by a depth of 74 ft., realised an average of 60*l.* each; whilst other side lots, of 15 ft. frontage, were sold for 45*l.* each. A tavern plot, having a frontage of 43 ft. to Rosebank-road, by a depth of 116 ft., realised 176*l.* With the exception of nine plots, all the lots offered were sold.

Mr. Charles Belton offered, at the Windsor Castle Hotel, Hammersmith, 105 plots on the Ravensworth House estate, at Walham-road. The property was described as having frontages to the Fulham-road and Cassidy-road, and being within a few minutes' walk of the Metropolitan District Railway station. There was a very large attendance at the sale, with an active and close competition for the several plots offered, the land being manifestly in great demand for building upon. The first lot offered was a corner shop plot, having a frontage of 17 ft. to the Fulham-road, for which there were several bidders, the lot being ultimately sold for 350*l.*, and an adjoining lot having a similar frontage to the Fulham-road realised 305*l.* Another corner plot, with a frontage of 20 ft. to Fulham-road, and a return frontage to Cassidy-road, reserved for a public house, and which it was stated would be the only one allowed on the estate, was sold for 410*l.*; whilst an adjoining lot, having a frontage of 17 ft., realised 285*l.* The remaining lots, having frontages of 16 ft., chiefly to the Cassidy-road, and intended for the erection of private residences, realised an average of 98*l.* per plot. The particulars only announced fifty-four lots for sale, but these having all been sold within an hour, and there being a dis-

position evinced by the company that more lots on the estate should be offered, the auctioneer put up the remaining portion of the estate, comprising forty-nine lots, all of which were quickly sold, the total number of lots disposed of being 105, and the aggregate proceeds of the sale amounting to 12,083*l.*

VALUE OF LAND AND BUILDINGS AT SOUTHEND.

SOUTHEND, as a seaside resort, is now said to be attracting large numbers of visitors, and building on an extensive scale is in progress in the locality. Messrs. Beadel & Co. held an important sale last week of property at Southend, when a piece of freehold land, called Shore Field, facing the sea, containing a little more than nine acres, was sold for 4,100*l.*; two enclosures of freehold land, containing twelve acres, realised 6,700*l.*; the Round House and five acres of freehold land fetched 2,020*l.*; four plots of freehold land, containing eight acres, were sold for 4,650*l.*; Grove Field House, and four plots of land adjoining, containing about three acres, realised 2,000*l.*; and twenty plots of freehold land, containing a little more than twelve acres, were sold for an aggregate sum of 6,180*l.* The total proceeds of the sale were 32,470*l.* The prices realised for the land amounted to an average of 500*l.* an acre.

ST. BOTOLPH'S, ALDERSGATE-STREET.

THE burial-ground of this parish, after having been closed for a number of years, has recently been transformed into a pleasure-garden, greatly to the benefit of the denizens of this busy and populous neighbourhood. The labyrinth of time-worn upright slabs, ycleped monuments, the inscriptions on which, having through decay ceased to record the purpose of their presence, have been mostly gathered together and placed against the boundary-walls. The vestry and churchwardens are to be commended for giving an additional lung to the City. With a view to date and mark this improvement, they have erected a handsome sun-dial in the centre, the work of Mr. Forsyth. The pedestal is executed in Portland stone, and is elevated on a platform of the same material, which can be used either as a step or a seat. On the base of the pedestal appears the following inscription: — "This ancient Burial-ground, converted into a garden by the vote of the Parish Vestry, and with the concurrence of the Vicar, was opened to the Parishioners by John Staples, esq, F.S.A., Alderman, on Thursday, October 28th, 1880. S. Flood Jones, M.A., Vicar; George Sims, C.C., John C. Hutchinson, Churchwardens. 1881."

IRISH JUDICIAL DECISION ON BUILDERS' LIABILITIES FOR ACCIDENTS TO WORKMEN.

IN the Belfast Recorder's Court last week, before Mr. Otway, C.C., a cause, "Murray *v.* Pauline," has been decided. The plaintiff, a bricklayer, sought to recover the sum of 40*l.* from William Pauline, of Belfast, builder, for damages sustained by him by falling off a scaffold which defendant had supplied, and which, as alleged, had been erected negligently and insufficiently.

His Worship, in giving his decision, referring to the Employers and Workmen Act, said that statute was chiefly passed with the object of giving a remedy to parties injured by the neglect of their employer,—to remedy what was considered an existing defect in the law. It contemplated, as far as was applicable to that case, the employer using for the purpose of his business certain works and machinery, and provided against injury from any defect in the machinery where such defect arose from the negligence of the employer, but it debarred a remedy when the workman who was injured knew the defect. The case, he thought, must then rest upon the previously existing law, and by that they all knew that the workman who engaged in a dangerous employment took all its ordinary risks, and the master was only bound to provide for the safety of the servant to the best of his judgment. There was no obligation upon the master to take more care of his servant than he would of himself. Here was a man who was a builder. He employed the plaintiff, who was a mason, to build a wall from 7 ft. to 10 ft. high. The workman put up a scaffolding; the employer went to him and doubted whether the scaffolding was sufficient; the workman replied, that "if he fell he would not have far to fall." But the master, thinking to make it more safe, put a piece of timber under the transverse plank. The scaffolding came down, the man fell a distance of 3 ft., and his arm was broken. Upon these facts his Worship held that the common law did not apply either: that it was a mere misadventure, and that the defendant was therefore not liable. He would, therefore, dismiss the case.

Mr. Ward, for the defendant, said he would not press for costs.

THE ART-UNION OF LONDON.

IF the question were asked,—What is the most potent factor in regulating economic operations in England at the present time?—would not the obvious answer be "Co-operation"? The wondrous results of this organisation, as announced at the meeting held a short time since under the presidency of Lord Derby, show the dimensions it has attained. In London who would have dreamed that the few chests of tea purchased by a small number of Post-office clerks, and divided amongst themselves at cost price, would be the germ of that system which is now represented by numerous associations, occupying buildings of large size and costly arrangement, and turning over hundreds of thousands of pounds annually?

A remarkable instance of this co-operative power is given in a work now being issued by the Art-Union of London. We allude to the set of etchings, very successfully produced by Mr. Flameng, from Mr. Frith's remarkable series of five pictures,—"The Road to Ruin." Every subscriber of one guinea to the Art-Union will receive this set of first-class prints, in addition to a share in the distribution of prizes, a work which no publisher could afford, single-handed, to produce for many times the amount; it happens, in fact, that, at this moment, a series of five plates, of a cognate subject, from paintings by the same artist, is offered to the public at the price of ten guineas, though the process employed to produce the engraving is really less artistic than the style of pure etching adopted by the Art-Union.

We must here notice how Science steps in to the aid of her art-sister. It would be impossible to produce within any reasonable time, by printing from the original five plates, the number of impressions which, judging from the demand for the chief works of the Art-Union, will, in all probability, be required to supply the subscribers in all parts of the world, but by the aid of that marvellous power which "puts a girdle round about the earth" in less time than Puck undertook to do it in, a reproduction of the plate is so accurately made that not the slightest difference can be perceived by the strongest magnifier between that and the original. The deposit of the infinitely minute atoms of the metal in the matrix is so subtle and so true, that the faintest indication in the original is accurately repeated in the other. By means of this multiplication of plates, any number of impressions, all of equal value, can be produced; and thus, within a comparatively short time, all the subscribers can be supplied.

Our readers will doubtless remember the pictures, which were always surrounded by a crowd in the Royal Academy Exhibition of 1878. Our modern Hogarth selects for his theme a phase of life of the nineteenth century with which all are, more or less, familiar. The story opens with a college card-party, just breaking up, at early dawn. The host, by his surroundings, is evidently gently nurtured and with abundant means. The painter then takes the hero to Ascot, where he stands, betting-book in hand, on the lawn, in the midst of fair women and the *élite* of the upper ten thousand. The not unfrequent result of a life so commenced ensues, and we have a visit from the bailiff's followers, foreshadowing the sacrifice of the costly furniture and all the appliances for a luxurious life by which we see the hero surrounded. Then follow exile, and the family with its scanty belongings seeking shelter in some small town in France or Belgium. The man and wife are endeavouring by pen and pencil to earn something to keep the wolf from the door, when the landlady enters with a long bill. In the last scene we are back again in England, and in a miserable attic; the early dawn looks in on a scene, how different from that gay party at Cambridge! The hero hurriedly locks the door, while on the table is a pistol, with caps and balls, terribly presaging what may be the object of their purchase.

We have here a series of scenes which pre-eminently tell their own story, and this is always a great element of success, since the majority of people like to be saved the trouble of thinking much before they arrive at the meaning of a picture. In this, as in everything else in the present day, we are all too much in a hurry to spare time for any one particular subject. The paintings themselves can be seen for a few days at the rooms of the association in the Strand.

RESTRICTIONS IN FEU CONTRACTS.

HISLOP *v.* LECKIE.

THIS was an appeal to the House of Lords from a judgment of the Court of Session in Scotland. The case was argued a short time ago, before the Lord Chancellor, Lord Blackburn, and Lord Watson, when judgment was postponed.

Their lordships, in giving judgment on the 23rd ult. said that the effect of the interlocutors appealed against was to enforce against the appellant, a carriage-builder in Edinburgh, at the suit of the respondents, who were adjoining occupiers, certain restrictions on building contained in a feu contract. Those interlocutors were right if the respondents, who were neighbouring feuars under the same superior, were, by the combined effect of their own and the appellant's titles, interested in the obligations and restraints imposed upon the appellant by his feu contract, so as to be able to enforce these obligations and restraints for their own interest, if the superior was or ought to be deemed a party complainant in the action in such a sense as to be suing for his own separate interest. Their lordships were of opinion, however, that the fact of several feuars of the neighbouring plots of building-land in the same street holding from a common superior did not of itself entitle one of those feuars to claim the benefit of restrictions contained in the feu contract of another, unless some mutuality and community of rights and obligations were otherwise established between them, which could only be done by express stipulation in their respective contracts with their superior, or by reasonable implication from some reference in both contracts to a common plan or scheme of building, or by mutual agreement between the feuars themselves. Here there were none of those things, and as the mere consent of the superior to the action being brought did not place him in the position of having brought the action in his own interest, the finding of the Court of Session in favour of the respondents must be reversed.

Judgment reversed with costs.

A WATER COMPANY FINED FOR INADEQUATE SUPPLY.

AT the Thames Police-court, last week, the secretary of the East London Waterworks Company was summoned before Mr. Lushington, by the owners of Sampson's House, Albion-street, Mile-end, for neglecting and refusing to furnish an adequate supply of water, for which the rates had been duly tendered and paid. Mr. Young, solicitor, conducted the prosecution. There were no fewer than twenty-eight summonses against the company for not providing a proper supply of water.

It was stated that there were two cisterns on the premises, 23 ft. from the ground, but the adjoining houses were supplied from butts only 4 ft. from the ground. Each cistern when full held about sixty gallons of water, but from the 15th of May until the 19th of June the supply was insufficient for the wants of the persons living in the house, and they had to borrow water from neighbours. The supply-pipes in the cisterns were in proper order, but the water was only laid on for twenty minutes, and did not flow freely.

Mr. Lushington, the magistrate, said he had no doubt that there was not a sufficient pressure of water. He imposed the full penalty of 10*l.* for that offence. The rates had been paid for the last two years, and the complainants were entitled during the whole of that time to a proper supply of water. He fined the defendants 20*s.* and 2*s.* costs on each of the twenty-seven summonses, and 5*l.* 5*s.* costs; making a total of 44*l.* 19*s.* to be paid to the persons who paid or tendered the rate.

Silk Cultivation.—Professor Luigi Sartori, of Treviso, after long study and outlay, has, he says, discovered a perfect system of cultivating silk-worms, a system by which Italy will be enabled to save 500,000,000 francs per annum. Since 1872, the *Japan Weekly Mail* says, Sartori has been delivering lectures on his new method in the various Italian towns, and, if rumour may be credited, his motives are purely patriotic. At a meeting lately held in Rome, Sig. Miraglia, president of the Agricultural Society, and many other competent persons, were present, all of whom declared themselves quite satisfied as to the importance and great advantages to be derived from Sartori's system. As a result of this meeting he received a Government prize of 500 francs, and had the honour of an audience with his Majesty the King, to whom he explained his scheme in detail. The King said that steps ought to be taken for overcoming the apathy of the Italian producers in this matter, by making them acquainted with the advantages of the new system. In order to show what interest he himself took in the industry, he ordered the construction, at his own expense, of a movable house for reproducing silk-worms, after the design of Sig. Sartori, to be exhibited at Milan.

PATENT RECORD.*

APPLICATIONS FOR LETTERS PATENT.

2,530. G. F. Wynne, Wrexham. Drilling, boring, or cutting rock, &c. June 10, 1881.

2,536. L. W. Beck, Duffel, Belgium. Drying ceramic products and bricks. June 10, 1881.

2,539. M. Delmard, Plumstead. Chimney cowl and ventilator. June 10, 1881.

2,555. A. Harvey, Glasgow. Water taps or valves. June 13, 1881.

2,559. G. F. Wynne. Wrexham. Drilling, boring, or cutting rock, &c. June 13, 1881.

2,561. C. H. Pennycook, Glasgow. Bars for securing glass for windows, &c. June 13, 1881.

2,576. W. J. Hopkins, Worcester. Expanding and contracting fire-grates. June 14, 1881.

2,590. W. R. Lake, Southampton Buildings. Grate-bars, &c. (Com. by W. N. Fairbairn, Boston, U.S.A.) June 14, 1881.

2,616. G. Hodson, Loughborough. Manufacture of chimney-pieces, &c. June 16, 1881.

2,624. W. T. Sugg, Westminster. Gas cooking-stoves. June 16, 1881.

2,628. W. W. Beaumont, Camberwell, and J. Welman, Poole. Apparatus for dressing and cutting stone, &c. June 16, 1881.

2,629. G. A. Wright, Portsmouth. Materials for forming blocks for use in buildings, &c. June 16, 1881.

2,633. S. Hodgkinson, Manchester. Window-blinds. June 16, 1881.

2,636. G. J. Cox, Maidstone. Gas cooking and heating stoves. June 16, 1881.

ABRIDGMENTS OF SPECIFICATIONS

Published during the Week ending June 18, 1881.

4,448. E. R. Hollands, Stoke Newington. Fire-grates.

The fire-basket has a movable bottom, and when the fire is to be fed, a set of bars enter from the back horizontally, and lift the fuel off the movable bottom, which then falls down and the fresh fuel is put thereon below the fire. The movable bottom is then raised and the horizontal bars drawn back. Oct. 30, 1880. Price 8d.

4,504. A. Jennings, Glasgow. Fire-places, &c.

The bottom and the back of the fireplace are made of brick, curving outwards at the upper edge, and the products of combustion flow backwards into a short flue pipe, which has a curved plate placed over its upper end to prevent any down-draught. A metal casing is formed above the fire-place, communicating by pipes with the outside air and the apartment, whereby the air of the apartment is thoroughly warmed. Nov. 4, 1880. Price 6d.

4,540. R. H. Reeves, Parkhurst. Apparatus for detecting the escape of noxious gases from drains.

A U-shaped tube is connected to the drain, which is partially filled with a chemical re-agent in solution. Potassic permanganate acidulated with acetic acid is preferred. A test paper prepared to be sensitive to this re-agent is inserted in the end of the tube, and a graduated scale is provided. The pressure, as well as the quality of the gas in the drain is thus determined. Nov. 5, 1880. Price 6d.

4,542. L. W. Leeds, Woburn-place. Steam heating apparatus.

The firebox is lined with fire-clay, and a large fire-brick is hung above the fire, leaving only a small annular passage for the escape of the products of combustion. This ensures thorough combustion of fuel. The generation of the steam is regulated by an air-pipe leading to beneath the grate-bars with another branch leading to the space above the suspended fire-brick, &c. The port of this pipe is controlled by a slide connected to a weighted lever, operated by a piston, whose motion is governed by the pressure of steam in the boiler. This pressure, as it increases, closes the air-port and checks the draught. Nov. 5, 1880. Price 6d.

4,544. H. H. Lake, Southampton-buildings. Furnaces or fireplaces for the combustion of fuel without smoke.

The fuel is fed through an opening arranged above the grate, and above the ordinary door, which has an inclined feed throat, upon which the fuel forms, in front, a heap having sufficient slope to allow it to fall upon the back part of the grate, where the combustion takes place. (Com. by La Société Nessi Frères, Paris.) Nov. 5, 1880. Price 6d.

4,585. W. S. Melville, Mile-end. Apparatus for supplying fuel to fireplaces.

A shovel has a chamber formed in the after-part, which has a hinged flap as a cover. The handle of the shovel is hollow, and receives the stem of a piston. The chamber is charged with fuel, and the flap closed. The shovel is then slidden into the lower part of the fire, the flap is lifted, and the piston ejects the fuel into the fire. The smoke is in this way consumed. Nov. 9, 1880. Price 6d.

4,640. H. J. Haddan, Strand. Apparatus for regulating and measuring the flow of liquids.

A vertical cylinder encloses a piston. A horizontal cylinder is connected to this below the piston, at the other end of which is an inlet chamber, provided with a disc valve. As the water enters by two orifices, it removes the valve a little from its seat, and so passes through the cylinder and up between the circumference of the piston and the inner surface of the vertical cylinder. If more water enters than can flow through this annular passage, the piston is lifted, and thereby actuates a lever in the horizontal cylinder, which causes the disc valve to partly close the passage. (Com. by F. de P. Isaura y Fargas, P. Garcia y Correra, and J. Barrufet y Vecians, Barcelona.) Nov. 11, 1880. Price 4d.

4,660. H. E. Cooper, Great Dover-street. Syphonic apparatus for closet flushings, &c.

A syphon pipe is attached by a flexible tube to the outlet pipe, and is held suspended by a lever with the bend a little above the level of the water. When it is pulled suddenly down, it establishes a syphonic action. (*Pro. Pro.*) Nov. 12, 1880. Price 2d.

* Compiled by Hart & Co., patent agents, 28, New Bridge-street, E.C.

CITY CHURCH AND CHURCHYARD PROTECTION SOCIETY.

THE second annual meeting of this society was held on the 23rd ult. in the Egyptian Hall of the Mansion House, under the presidency of the Lord Mayor.

Mr. Wright, hon. sec., read the report, from which the following is a quotation:—

"The Council, in presenting their second annual report, are deeply thankful to be able to announce that the yearly destruction of a City church, which had been the average for the past ten years, has, since the formation of the society, happily ceased. They cannot, however, believe that all attacks have ended, but have been postponed in order that the public mind may be prepared for some more drastic scheme on the publication of the census returns of those who slept in the City on the first Sunday in April. But, fortunately, there will be equally reliable statistics from the day census taken by the Corporation as to the vast numbers of those who spend the greater portion of their lives within the confines of the City parishes. The attention of the council has been drawn to a return published in the *St. James's Gazette* for June 13th, 1881, professing to give returns of the congregations of the City churches, which they believe to be misleading. That census is based on the attendance at the morning service, but those in the habit of worshipping in the City churches know that the evening services are frequented by much larger numbers."

Mr. H. C. Richards, in moving the adoption of the report, gave it as his view that there were signs of a disposition, on the part of merchants and others, to reside in the City.

Mr. C. Kegan Paul seconded the motion. He did not propose to enter at any length into the arguments for the retention of their churches and churchyards, as he had already done so in a recent number of the *Nineteenth Century*. Supposing the churches were empty on the Sunday, and even supposing they were not utilised during the week, yet they should not be pulled down. He believed the time would come when the resident population of the City would be much greater than it was now. But apart from this, there was the historical and architectural value of the churches.

The report was unanimously adopted.

The Rev. Canon Venables (of Lincoln) moved, "That this meeting expresses its satisfaction at the success which has hitherto attended the efforts of the Society." Although he was an ardent lover of Gothic, he was eclectic in his admiration, and he was a great enthusiast for Sir Christopher Wren's churches. When he looked back he could remember the grand old buildings,—St. Michael's, Queenhithe, and St. Benet's, Gracechurch-street. He could never forget the graceful spire of St. Antholin's, and he could not understand why it was swept away. He believed if City clergymen would give good services and live in their parishes they would get people to attend church.

The Rev. Canon Shuttleworth seconded the motion, which was adopted, as was one pledging the meeting to support the Society in further action to prevent the demolition of any more of the City churches.

ARCHITECTS AND QUANTITIES.

SIR,—"H. H. B.'s" letter in your issue of June 18th would surely have been better unwritten. An impartial observer would come to the conclusion that the merits of "H. H. B." and the surveyor's clerk had been compared, and that the comparison had been unfavourable to the architect. It is nonsense to argue that a man makes a change like that as a pure matter of caprice. The result was, no doubt, galling, but it surely is not sufficient justification for the mud "H. H. B." throws at surveyors generally towards the end of his letter. Would the contents of the "snugly-packed nutshell" have been less if "H. H. B." had carried out the work and taken off the quantities in his own office? or, for the matter of that, in any case where the architect attempts it?

C. P.

The Rowland Hill Statue, Kidderminster.—The statue recently unveiled at Kidderminster is placed upon a pedestal of Cornish granite from the Carnsew Quarries of Messrs. John Freeman & Sons, Penryn.

"KING INA'S PALACE."

SIR,—You may, perhaps, remember that some twenty or thirty years ago there was a talk of my buying the Mediæval house called King Ina's Palace for the purpose of preserving it, but from circumstances into which it is now useless to enter I did not do so, and it fell into the hands of some one who knew nothing or cared nothing about architectural history, but who had some money, and he employed the builder of a neighbouring town, who dubbed himself an architect, to "restore" it, as he called it,—in other words, to destroy all that gave it any value. The peculiarity of it was that the original woodwork and all the internal arrangements were entirely preserved, of which I know no other instance. My lamented friend Burges, whom I have lately lost, told me that some friend of his, another young architect I think, had a complete set of drawings of it, if I liked to buy them and have them engraved. It was not convenient for me to do this at the moment, and I let the opportunity slip, which I now regret. Perhaps you can tell me who this was, and whether the drawings are still to be had? If you do not happen to know, perhaps you can make inquiry for me, and let me know the result.

Some twenty years ago, after my long and serious illness at Windsor, I was sent to Rome by my doctors, and I spent fifteen winters there, becoming so much interested in the archæology of Rome that I somewhat neglected that of England for a time. I am now forbidden to go there again, and am told that I must remain quiet in England for the remainder of my days.

JOHN HENRY PARKER, C.B.

*** We do not know if the drawings are still to be had, but we hope one of our readers will give the required information. We have good reason to remember "King Ina's Palace," for the insertion of a letter at the period above referred to, from an eminent archæologist, commenting on the restoration, and our refusal to give up the name of the writer, brought upon us, as Mr. Parker will recollect, an action for libel, and cost us much trouble and more than 300*l*. The second and only other action for libel that we have had to defend was brought on us by the insertion of a short letter exposing the condition of a back-yard near Charing Cross, the correctness of which was proved by several witnesses, and for which we were mulcted in the sum of 250*l*. It is thus that enlightened British juries have expressed their admiration of long-continued efforts on the part of the *Builder* to protect our ancient monuments and improve the health of towns! However, we are not complaining; we are simply telling a story which is not uninstructive.

ASHBURNHAM HOUSE.

SIR,—I see that in your last week's print there is a short letter signed "G. J.," wherein the question is very rightly raised, at this time, as to who was the architect of this noteworthy building.

I think it would be well for students if you encouraged the bringing out as many facts as possible on the subject; and if you brought forward the opinions of sound judges of style, some satisfactory decision might be come to. My own opinion (sound or unsound) is, first, that the house was designed by a skilled architect of the time, and not by a mere follower of the fashion of the day; secondly, that the style is more free from the vice of stateliness, with its attendant dulness, which so cursed the Renaissance art of Europe, than is seen in Wren's or the architecture following his. Wren was so great a man that he avoided the worst faults of the style; but I have seen no work of his where so much richness and invention are allied to such simplicity and directness as is plain on the face of the original parts of Ashburnham House. On close examination of the detail it will be seen that, here and there, and that frequently, there is some touch of the naturalness and invention of an earlier style. Notice the conventional roses in the pierced scroll-work; the pattern in the soffit of the corona of one of the cornices; and the leafage in the carving of the projecting beads of the panel frames. Also, notice the rather rude but vigorous and artistic way in which the great egg-and-tongue moulding is carved on the staircase. These things alone would not have biassed my mind very strongly; but finding them in combination with admirable proportion, with such aptitude in adapting the so-called Classic

forms; and, lastly, but the most telling point of all, seeing what an appearance of space and dignity is gained, and yet with a homeliness of effect, I cannot but think that the architect of Laud's Quadrangle, at St. John's College, Oxford, built Ashburnham House, Westminster.

PHILIP WEBB.

SYNTACTIC ARCHITECTURE.

SIR,—The Maudles and Postlethwaites of architecture who continue to "exist beautifully," and, in spite of their apparent unmanliness, manage, by some means, to increase and multiply, must admit that there must be some proportion between width and height both in a whole building and in a section, or bay. It is time that something were done to draw up a set of rules as a guide to assist in designing, but not to obstruct.

The Vitruvian rules, I admit, are by far too rigorous, and their enforcement was one of the causes that led to a reaction in the opposite direction.

Many customs, manners, and costumes have had their origin in architecture. The æsthetic school of the present day clearly owes its origin to the pleasing school of architecture. Architecture, therefore, has a great responsibility, even though it be partly accidental.

It will, I think, be a moral disgrace to our profession if we do not use the means that we find are in our power of putting an end to what is literally nauseous.

W. S.

MILDEW.

SIR,—I would advise "A Reader" to try tinfoil. I have used it in several trying situations myself, and it has always succeeded. It may be applied to the wall by means of a paste made of thick white-lead paint, taking care to let all get well dried before papering over it. Although the first cost may be rather more than some of the other and more usual, though practically worthless, preparations, it will be very much cheaper in the end. The cost of the tinfoil will be about 7s. 6d. per roll of thirty-six sheets, each sheet measuring 18 in. by 16 in.

H. G.

FORFEITURE OF BUILDERS' GOODS TO FREEHOLDERS.

THE following memorandum has been addressed to the Committee of the House of Commons now considering the Bill of Sale question, and deserves consideration:—

Will you pardon my drawing your attention to a matter which would, I venture to suggest, be worthy of investigation by you, as it seriously affects merchants trading with builders?

It is now perpetually the case in the failure of a builder for the creditors to find that the bricks, timber, lime, iron, lead, and other goods supplied to the builder are, although not fixed to the building, but simply lying loose on the ground, claimed by the landowner, under a clause in the building agreement, which forfeits to the landowner all loose material in the event of the builder filing a liquidation petition.

Surely, as against the creditors of the builder, this is a most vexatious clause, and should be altogether prohibited by law, or, at least, deeds containing such clauses should be registered as bills of sale.

It is a very easy and common thing for an owner of land to "get a man of straw" to build for him under the foregoing conditions, coupled with promises of never-failing funds, on the strength whereof the builder gets large quantities of goods on the job, and when his liabilities fall due, the landowner not finding sufficient money to enable the builder to pay for such goods, the builder is compelled to file his petition, and the landowner, under the forfeiture clause in the building agreement, takes possession of the land, buildings erected thereon, with the creditors' goods, and more particularly of the loose goods on the ground; and when the builder meets his creditors he simply informs them of this, and expresses regret, alleging the landowner has deceived him.

The creditors cannot help themselves, and feel bound to accept almost any offer that is made, such offer very often being secured by the landowner.

ROBERT GIFFORD, A. C. A.

The Proposed New Railway Station at Blackfriars.—Last week a Select Committee of the House of Lords passed the Bill authorising the London, Chatham, and Dover Railway Company to construct a double line of rails, commencing at the south end of Blackfriars passenger station and terminating at the south side of Upper Thames-street. The Bill gives powers to the company to carry the lines across the Thames either by widening their existing bridge at Blackfriars or constructing a separate bridge with four sets of piers in the river similar to the present one. These works are about to be carried out in order to relieve the city and suburban lines of this company.

CHURCH-BUILDING NEWS.

Four Elms, Kent.—The new Church of St. Paul, Four Elms, near Edenbridge, has been consecrated by the Archbishop of Canterbury. The building, which is Early Thirteenth Century in style, consists of nave, transepts, and chancel. On the north side of the latter are the vestry and organ-chamber, and at the west end of the church is a semicircular recessed baptistery. The walls are of Portland cement concrete, faced externally with Limpsfield stone, and internally with Bath stone, relieved by bands of Tonbridge sandstone. The dressings are of Box-ground stone. The open-timbered roof, which is of pitch-pine (all the rafters and timber left in their natural state, and the boarding between stained dark walnut), is covered with tiles, and surmounted by an oak *flèche*, containing the bell. The seats and fittings throughout are also stained walnut, and varnished. The east end is square, and contains a window of five lancet lights, the inner order of the arch-mouldings being carried on detached shafts of blue Pennant, with moulded bands and carved caps. This window is filled with a representation on the principal fields of the "Ascension," under which are five groups,—the "Agony," "Bearing the Cross," the "Crucifixion," the "Resurrection," and "Noli me tangere." The subjects occupy the entire area, without canopies. The windows on either side of the sanctuary contain our Lord as the "Bread of Life" and the "True Vine," and two other windows in the chancel the "Good Shepherd" and the "Light of the World." All these have fields of foliated ornament. The south transept, or St. Paul window, of three lights, contains the "Stoning of Stephen," "Conversion of St. Paul," and "Preaching at Athens." These all have canopies. The baptistery contains seven lights,—two, the "Passage of the Red Sea"; two, "Noah Entering the Ark"; and the centre three, "Christ Blessing Little Children." All the glass has been executed by Messrs. Clayton & Bell. The floor of the chancel is in rich tiles and mosaic, by Messrs. W. B. Simpson & Sons. The font, which is of Caen stone, was executed by Mr. Bradford, of Kennington. The pulpit, which is in character with the font, was executed by the builders. The rails, &c., to pulpit steps are of hammered and polished brass, and, together with the pendent and standard lamps, brackets, &c., were executed by Messrs. Faraday & Sons, of Berners-street, W. The organ is by Messrs. Gray & Davison. The heating apparatus is by Messrs. Bacon & Co. The brass lectern and the altar-cloth are by Messrs. Frank Smith & Co. The builders were Messrs. Punnett & Sons, of Tonbridge; and the whole of the work has been carried out from the designs and under the superintendence of Mr. Edwin T. Hall, of London.

Monmouth.—The restoration of St. Mary's Church, Monmouth, has been commenced. The architect is Mr. G. E. Street, R.A., and Messrs. Wall & Hook are the contractors.

Heaton Norris.—A meeting of parishioners has been held to consider alternative plans prepared by Messrs. Preston & Vaughan, architects, of Manchester, for the enlargement of the church. In either scheme it was proposed to form a quasi-chancel or *chorus cantorum* by enclosing the most easterly bay of the nave with screens of light open wood-work on the north, south, and west sides; and by raising the floor two steps above the level of the present nave floor. New reading-desks and choristers' seats would be placed in this quasi-chancel, and the floor between the seats would be laid with encaustic tiles. The present west entrance would be entirely re-arranged in order to render it more convenient for worshippers entering or leaving the church, and the font would be removed to the west end of the north aisle. In the first or lesser scheme the present vestry would be retained, and a porch with a staircase leading to a new choristers' vestry above would be erected on the north side of it. The organ would be removed from its present position in the west gallery, and placed in the north-east corner of the north gallery. In the second scheme it was proposed to extend the present sacrarium about 9 ft. eastwards, in order to form a chancel of due proportions to the size of the church, and to build new priests' and choristers' vestries on the north side of it, with porch and staircase leading to a spacious organ-chamber above. The organ chamber would be open to the church on the south and west sides, and there would be traceried screens in the archways. Under the east window, which would be remodelled, there would be a new reredos. After some discussion it was resolved unanimously to adopt the second scheme, and to apply for a faculty for its execution.

Ryde, I.W.—Mr. Barton, the contractor for the completion of the parish church, has commenced the work. The architect of the church was the late Sir Gilbert Scott, R.A., and his son, Mr. John Oldrid Scott, has prepared the plans for the completion of the tower and spire, &c. The tower is to be built of the best Swanage stone, in irregular courses, 80 ft. from the ground, and finishing with a battlemented parapet, with carved pinnacles at each corner. The spire will be octagonal in shape, and will be decorated at the base with four crocketed double-pinnacled lights. The spire will be built with the best Box-ground Bath stone, terminating with a cap of solid Portland stone.

Poole.—The corner-stone of a new organ-chamber and vestries for Parkstone Church has been laid by Lady Brown, of Hillside, Parkstone. These additions, the site of which is on the north side of the chancel, are of Gothic design, harmonising with the present structure, and the dimensions are,—vestries, 44 ft. by 16 ft., and the organ-chamber 12 ft. by 14 ft., with a height of abont 30 ft. Mr. Pearson, R.A., is the architect; Mr. S. Clarke, of Parkstone, the builder; and Mr. H. F. J. Barnes, of Poole, the clerk of the works.

Ludlow.—The new Church of St. John the Evangelist has been consecrated. The foundation-stone was laid on the 10th of June last year. The church is situated on a commanding site on Gravel Hill, and it is built in the Early English style. It consists of a nave, chancel, south aisle, vestry, and porch, the dimensions of which are as follow:—Nave, 74 ft. long by 24 ft. 4 in. wide; chancel, 30 ft. by 22 ft. 3 in.; south aisle, 77 ft. 10 in. by 10 ft. 9 in.; vestry, 15 ft. 6 in. by 11 ft. 6 in.; porch, 7 ft. 6 in. by 7 ft. From the floor, the height of the nave walls is 23 ft.; the chancel, 21 ft.; and the south aisle and vestry, 11 ft. The height to the apex of the nave roof is 43 ft., and 38 ft. to the apex of the chancel. A lean-to roof is placed over the south aisle. The timber used in the construction of the roof is of wrought and moulded pitch pine. The chancel roof is boarded on the underside with pitch-pine, and divided into panels, with moulded ribs and cornice. The walls of the church are built of native Pennant stone, with rock face, and squared beds and joints. The external dressings to the windows, doors, buttresses, bell-turret, and gate piers and copings are all of Box weather stone; and the internal dressings of the arcades and chancel arch are of Corsham Down stone. Provision has been made for a future north aisle; the arcade has been built, and the arches erected, with a two-light tracery window inserted in each arch. The bell-turret stands on the west gable of the nave, and rises about 20 ft. above the nave roof. The cost of the church is 4,000*l.* The architect is Mr. A. W. Blomfield, M.A., of London; and the contractors were Messrs. Wall & Hook, Brimscombe, Stroud.

Birmingham.—The foundation-stone of a new chancel to All Saints' Church has been laid. In connexion with the chancel two vestries will be built. Other works to be done include the removal of the side galleries, the re-seating of the church, and the provision of improved arrangements for lighting and heating the building. It is estimated that an expenditure of about 1,400*l.* will be required to effect the various improvements, which are being carried out by Mr. W. Robinson, builder, from the designs of Mr. J. A. Chatwin, architect.

SCHOOL-BOARD SCHOOLS.

London.—At a meeting of the School Board for London, on the 2nd ult., on the motion of Mr. Stiff, a recommendation of the Works Committee was adopted, to the effect that an expenditure of 290*l.* should be sanctioned for the erection of a cookery class-room on the Marlborough-road site (Chelsea). Mr. Stiff then moved the adoption of a report of the Works Committee, containing the following recommendations:—The committee have invited tenders for the erection of a school to provide accommodation for 1,100 children on the site in Lyndhurst-grove, Peckham. The committee recommend that so soon as the plans shall have been approved by the Education Department, the lowest tender, that of Mr. Tongue, of Plumstead,

amounting to 9,992*l.*, be accepted. Cost per head, school buildings only, 6*l.* 18*s.* 4*d.* Total cost per head, 9*l.* 1*s.* 8*d.* The committee have invited tenders for the enlargement of the school in Thornhill-road, Islington, by 200 places. The committee recommend that, so soon as the plans shall have been approved by the Education Department, the lowest tender, that of Messrs. Wall Brothers, of Dale-road, Kentish-town, amounting to 1,699*l.*, be accepted. Cost per head of school buildings only, 6*l.* 19*s.* 1*d.* Total cost per head, 8*l.* 9*s.* 10*d.* The school in Orange-street, Borough, was erected by the Board in 1873-4, and, in order to keep down the cost per head, no rooms were provided for teachers, and only an insufficient amount of cloak accommodation for the children. The committee think that these deficiencies should now be supplied, and they have accordingly obtained tenders for erecting three teachers' rooms, and also for providing proper cloak accommodation for the three departments of the school. The committee recommend that, so soon as the plans shall have been approved by the Education Department, the lowest tender, that of Messrs. T. E. Julian & Co., of Marshall-street, St. George's-road, S.E., amounting to 675*l.*, be accepted.

Stockton.—New Board-schools in Bowesfield-lane, Stockton, have been opened. The style adopted is described as "Early English, adapted according to the requirements of plain brick-work, in which all the coupled windows, arches, and mullions are executed." The central portion is occupied by the infants' school, the roof of which is higher than any of the others, being surmounted with a ventilating turret, with a steep-pitched lead roof and vane at the summit. This central block is flanked on the north and south by the girls' and boys' departments respectively, with ornamental terminals at the apices of roof. The main front and sides consist of a repetition of coupled lancet windows and piers, supporting arches and labels with ornamental scrolls of foliage, also fillings-in of bold terra-cotta bosses. This front is relieved by four projecting gables, which have each a lofty three-light window, comprised within a large arch, filled in with pointed diagonal brick-work. The top portion of these gables has a perforated stone ventilating band and red diaper work in relief, with a moulded stone finial and stone coping. Internally the schools are lofty, and lined with a dado 4 ft. high of glazed bricks, with coloured bands along top and base. The schools were built by contract, the price being 3,083*l.*; and the total number of children for whom accommodation is provided is 723. Messrs. Wetherell & Moses were the architects; Mr. Lazenby was the builder; and Mr. John Bage the clerk of works.

Warley (near Sowerby Bridge).—The corner-stone of a new girls' school for the Warley School Board was laid on Whit Monday. The building, when completed, will be a substantial structure, provided with all modern appliances. Mr. Utley is the architect.

Aston.—New Board-schools in the Albert-road, Aston, have been opened. The schools consist on the ground-floor of the boys' school-room, 80 ft. 8 in. long by 22 ft. wide, with three class-rooms, each 24 ft. 8 in. by 22 ft.; the infants' school-room, 64 ft. by 30 ft.; the babes' room, 30 ft. by 24 ft.; and two class-rooms, each 30 ft. by 23 ft. The girls' school-room is placed on the first floor, and is 62 ft. 9 in. by 22 ft. 9 in. with two class-rooms, each 24ft. 8 in. by 22 ft., and a third 25 ft. 5 in. by 22 ft. Separate entrances, with lavatories and cloak-rooms, are provided to each school; separate rooms are also provided for the use of the master and mistress in each school. The whole afforded accommodation for 320 boys, 280 girls, and 502 infants, making a total of 1,102. The play-grounds have been paved with tar paving, and have covered sheds for the protection of the children in wet weather, and the whole site is enclosed with a fence railing. The materials employed are of the simplest kind, the principal portion of the facings being of common red bricks. The heating apparatus for the school and class-rooms has been supplied by Messrs. Haden & Sons, and the works have been carried out by Messrs. Wilson & Son, under the direction of the architect, Mr. E. Holmes. The cost of the site, which consists of 5,000 yards, was 2,550*l.*; of the buildings, including a caretaker's house and architect's commission, 8,244*l.*; and of the furniture, 517*l.*; making the total expenditure 11,311*l.* The cost per head, exclusive of the site, is 7*l.* 19*s.*; and, including the site, 10*l.* 5*s.* 3½*d.*

STAINED GLASS.

Prestbury.—A memorial-window, the work of Messrs. Burlison & Grylls, of Newman-street, London, has been placed in the old parish church of Prestbury. It occupies a position over the doorway in the west gable of the recently-restored north aisle, and is of three lights, with a pointed head filled in with tracery of Perpendicular character. The central light contains a figure of the Saviour crowned with thorns and bearing His cross, the two Marys are represented as following, and in the rear is seen the door of the Prætorium. In the side light, on the left, the subject is Martha and Mary at the feet of Jesus, and the corresponding light on the right has a representation of the two Marys at the sepulchre. Each group of figures is surmounted by a canopy enriched with tabernacle work, and in the spandrels of the principal lights is an inscription.

Ramsgate.—Two stained-glass windows have been placed in the clearstory at St. George's Church, to the memory of the late Miss Sarah Rammell, by Mr. George Rammell and other members of her family. They represent St. George, the patron saint of the Church of England, and St. Alban, the first British martyr. They were executed by Messrs. Clayton & Bell, of London.

Pennfields. — A three-light stained-glass window has just been placed in the north transept of St. Philip's Church, Pennfields, near Wolverhampton, in memory of the Rev. Prebendary Dalton, who was vicar of that church for many years. The window is from the works of Mr. Samuel Evans, West Smethwick, Birmingham, and the subject treated is "Christ blessing little Children."

Miscellanea.

The Proposed Removal of the Mint — At a sitting of the Select Committee to whom the City Lands (Thames Embankment) Bill was referred by the House of Commons, Mr. Shaw-Lefevre in the chair, Mr. Wollaston Blake, of the firm of James Watt & Co., Birmingham, —a director of the Bank of England,—gave evidence in support of maintaining the Mint in its present site. He saw no necessity for the removal to the site on the Thames Embankment, which would entail an expense of 480,000*l.*, of which 235,000*l.* would have to be paid to the Corporation of London for the land, 45,000*l.* for machinery, 50,000*l.* for interest of money for four years before the old site could be disposed of and the new building erected, 15,000*l.* for professional expenses, and 15,000*l.* for contingencies. Deducting 180,000*l.* for the old site would leave a net cost of 300,000*l.*, for which he saw no occasion. Mr. Bramwell, C.E., on the contrary, stated that none of the plans submitted to him were such as he could adopt, his dominant instruction from Government being that there must be no stoppage of the Mint. He thought no satisfactory alterations could be made at the present Mint without rebuilding it, which would take eighteen months or two years.

Society for Improving the Condition of the Labouring Classes.—The thirty-seventh annual meeting of this society was held last week at Willis's Rooms, the chair being occupied by the Earl of Shaftesbury, the president. The secretary read the annual report of the committee, from which it appeared that the houses of the society are in good repair. The society's annual summary of the deaths and their causes placed the rate of mortality throughout the houses at 20 per thousand. From the cash account, it appeared that the receipts from all sources during the year amounted to 5,788*l.* 5*s.* 2½*d.*, which, with a balance in hand at the beginning of the year, made a total of 6,417*l.* 5*s.* 7½*d.* The total expenditure amounted to 5,947*l.*, leaving a cash balance of 470*l.*

Sculptures, St. Mark's, Venice.—Mr. G. Grove writes to urge that it would be a benefit to those who attempt to study St. Mark's, Venice, if a book were published containing a list of all the sculptures and mosaics of the church, with their inscriptions. "The list should begin from some definite point, and follow a regular order; should give the subject of the piece and the inscription thereon, with its decipherment, if necessary; and the known or probable date."

Lydd and Dungeness Railway—The Government inspection of a new line of railway, which may probably develop at no distant date into a new route to the Continent, has just been completed. The new line accommodates a district which has hitherto lacked railway facilities. It branches off at the Appledore Station of the Rye and Hastings branch of the South-Eastern Railway,—65 miles from London,—and passes through or by the villages of Snargate, Brenzett, Old Romney, Mydley Chapel, and the ancient town of Lydd,—where there is a station,—to a point about one hundred yards north-east of Dungeness Lighthouse. The promontory of Dungeness is the nearest point on the English coast to the Continent, Cape Grisnez being distant not more than twenty miles. The length of the new line—which is designated as the Lydd and Dungeness Railway—is ten miles. The depth of water at Dungeness, even at low tide, is never less than 15 ft., so that vessels of the draught of the Holyhead packets can ride safely at almost a stone's throw from the beach. Whenever the Dungeness and Le Tréport route to the Continent is realised, it will be the shortest between London and Paris. The line, which has been constructed by Mr. Walker at a cost of less than 7,000*l.* per mile, will probably be opened for public traffic in the course of the month of July.

Messrs. Barnard, Bishop, and Barnards have sent us three of their Illustrated Price Lists, those namely of their "Carved Wood Mantel-pieces," "Plain and Art-Painted Tiles," and their "Low Combustion Stoves." This firm first got a name out of their own town by the excellent wrought-iron gates they sent to one of the Great Exhibitions, of which we gave an illustration at the time, and they have continued to maintain a good character for the art employed in their manufactures. The low combustion stoves, introduced by them, have found imitators. Their "art-painted tiles" are much better in design than many we have seen. In fact, as a rule, the productions of this firm are very satisfactory.

"Scientific Evidence."—Judge Hutton, of the Oldham County Court, appears to have a very poor opinion of the value of the evidence of experts, or as it is sometimes called, "scientific evidence." In a case that came before him last week, counsel expressed regret that scientific evidence was not adduced. Judge Hutton; —"Oh, no; I am very glad there is none. As Earl Cairns said in effect, these scientific witnesses cannot be indicted for perjury, and generally say what they are paid to say."

North Wales Slate Trade.—The depression in the slate trade still continues without prospect of improvement. At Lord Penrhyn's Carnarvonshire quarries the output is still limited to four days a week, and much distress prevails in the district. It is hoped that much of the surplus labour will be absorbed in the construction of the new line of railway connecting Bangor with Bethesda, which is about to be commenced. At the Llanberis quarries full time is still worked, but the staff of workmen has been reduced and the wages lowered.

International Sanitary Exhibition.—The arrangements for this Exhibition are now complete. The offices are removed from the Parkes Museum to the Exhibition buildings at South Kensington. The Right Hon. Earl Spencer, Lord President of the Council, has accepted the office of president, and will preside at the opening ceremony on Saturday, July 16th. The Exhibition is to be complete on Wednesday, July 13th, and the judges will make their examinations for the awards on the two days previously to the opening.

Great Strike of Nailers.—The whole of the wrought-nail makers of Blackheath, Rowley, Dudley, Sedgley, Gornal, Old Hill, and Bromsgrove, have ceased work, in consequence of their demand for an advance of 30 per cent. not having been granted. The operatives number 30,000 men and women. Mr. John Price, the Secretary of the Nail-makers' Association, says that the present rate of nailers' wages is about 47½ per cent. lower than in 1875.

The British Legation, Athens.—We understand that Mr. James Hill, of Upper Thames-street, has just shipped a considerable number of his improved locks and door-fittings to Athens, for the New British Legation Buildings; and, we believe, the order is the result of a former shipment to Athens for Dr. Schliemann, which gave both him and his architect great satisfaction.

Architecture, University College.—Mr. T. Roger Smith, F.R.I.B.A.:—

Construction, Second Series. Donaldson Silver Medal. A. W. Glasson, of London. Prize. T. R. Clemence, of London. *Second Class.* G. Havill, of London. *Third Class.* A. Gillespie, of Blackheath; H. W. Teed, of London; Charles Turner, of London. First Series. Prize. H. C. Clarke, of London. Certificate 2.* F. A. Gerrish, of London. *Second Class.* F. C. Nichols, of London; G. C. Nichols, of London. *Third Class.* John Briggs, of London; E. Crisp, of London; H. W. Parkinson, of London.—*Fine Art*, Second Series. Donaldson Silver Medal. A. B. Cottam, of Watford. Prize. A. W. Glasson, of London. *Second Class.* C. J. Tait, of London; K. Tatsuno, of Japan.—*Modern Practice.*—Prize. A. Ashbridge, of London. *Second Class.* C. H. Bedells, of Crouch End; W. J. Lander, of London; C. E. Pertwee, of London; A. B. Pite of London. *Third Class.* J. D. Butler, of London; W. Grellier, of London; W. A. Pite, of London.

The students in the first and second series were, this year, examined separately. Several of them passed creditably on both occasions; but, following the precedent of other years, the Council of the College have only granted to such students a certificate or prize for the more important of the two examinations. The award of the Donaldson medal was made by Professor Lewis; that of the other prizes was made by other architects familiar with examination, at the request of Mr. Roger Smith.

Croston.—The foundation-stones of a new Wesleyan chapel at Croston, near Ormskirk, have been laid. The new chapel will be built on the eastern side of Westhead-road, on a freehold site given by Mr. W. Woods, of Croston. The style will be Gothic. The walls will be built of Croston bricks, and all outside walls will have a 3-in. cavity. The front and sides will have Long-ridge stone base courses, cills, strings, buttress weatherings, and moulded labels round window and door arches. The whole of the internal woodwork will be of the best pitch-pine, twice varnished The chapel will seat 300 persons. The plans have been prepared by Mr. S. Hurst, of the firm of Messrs. Maxwell, Tuke, & Hurst, architects, Southport, and the works will be carried out under the architect's personal superintendence. Mr. W. Vaughan, Southport, is the sole contractor. The entire cost will be about 1,200*l.*

Peckham.—The foundation-stone of the New Unitarian Chapel in Avondale-road, Peckham, was laid by Sir James C. Lawrence, bart., M.P., on the 23rd ult. The style adopted by the architect, Mr. Henry G. Brace, of Chancery-lane, is Early English, and the materials used externally will be red brick with stone dressings. The chapel will hold 250 persons on the floor-level, and 50 in the gallery. Internally, the facing will be of Luton brick, with red bands, and open timber roof. After the ceremony above recorded, the school-room, just completed in connexion with the chapel, was formally opened. The room is 33 ft. by 50 ft., with stock-brick facings, and red bands internally, with roof partly open. The builders of the chapel are Messrs. Hoare & Son, and of the school, Messrs. Watson & Dennett.

Jubilee of King's College.—At a meeting, held at Willis's Rooms on Midsummer Day, the Archbishop of Canterbury in the chair, it was resolved to commemorate the jubilee of King's College by the erection of suitable buildings in which to carry on the work of the institution in connexion with the higher education of women. Canon Barry, the Principal of the College, stated that the cost would be 20,000*l.*, of which sum more than 3,000*l.* has already been raised. An appeal is made to the public to support the scheme.

International Exhibition of Machinery and Tools at Liege.—Readers will find in our advertising columns notice of an International Congress of Contractors, which is to be held in Liège on the 24th, 25th, and 26th of July. In connexion with the Congress there is to be an exhibition of machinery, engines, tools, and building materials, which will remain open until the 31st of August. We invite attention to the particulars given, as we have reason to believe that the enterprise is undertaken with the most satisfactory auspices.

New Infirmary, Shoreham.—The Steyning Union Rural Sanitary Authority are about to erect a new infirmary in two blocks, for male and female patients, at the workhouse, Shoreham, Sussex. The works will be carried out under the superintendence of Mr. S. Johns, district surveyor, Portslade.

Painters' Wages at Oldham.—The Oldham painters have returned to work on the old terms, after having struck for an advance of one half-penny per hour.

Sculpture.—The Corporation of the City of London have commissioned Mr. C. B. Birch, A.R.A., to execute a marble bust of the late Earl Russell to be placed in the Guildhall. The Council of the Sydney International Exhibition have awarded to Mr. Birch the first medal and diploma for his bronze group "Retaliation," which has been purchased for the Sydney National Gallery.

TENDERS

For construction of Main Drainage and Outfall Works at Leyland, Lancashire, for the Leyland Local Board. Mr. Wm. Wrennall, engineer:—

Isaac Anwell, Liverpool	£6,907 8 1
George Bell, Gateshead	6,651 18 6
George Smith & Co., Southport	6,604 5 0
James Cardwell, Blackpool	6,453 16 3½
Wm. Pollitt, Bolton	6,300 0 0
Robert Pitt, Liverpool	6,029 19 6
Chas. Harris & Wm. Jenkins, Great Harwood and Blackburn	5,835 19 11½
Wm. Taylor & Sons, Higher Walton, Preston	5,759 17 6
George Hunter, Colchester	5,660 19 6
John Dovenor & Son, Stoke-on-Trent	5,625 7 5
Fawkes Bros., Birkdale	5,619 9 6
John Jowett, Brighouse	5,547 8 2½
Frank Dawson, Bury	5,488 10 0
Henry Hodkinson, Westhoughton	5,321 11 8
S. W. Pilling & Co., Manchester	5,258 7 1
James Jemson, Preston	5,215 7 0
Peter Walkden & Co., Liverpool	5,200 0 0
Wm. Winnard, Wigan	5,000 0 0
Bickerstaffe & Crombleholme, Preston	4,984 0 0
Taylor & Duckworth, Manchester	4,979 0 0
G. S. Boag & Co., Liverpool	4,919 13 6
Robert Jeffreys, Colwyn	4,879 11 4½
Samuel Cowburn, Hindley	4,768 8 0
G. G. Rayner, Bootle	4,685 0 0
John Walmsley, Preston	4,559 0 0
G. & J. Foote, Elton, Bury	4,319 7 6
Wm. Cunliffe, Leigh (accepted)	4,308 19 0

For new boundary-wall and other works at the Casual Wards, in Macklin-street, Drury-lane, for the Guardians of the Poor of the Parishes of St. Giles-in-the-Fields and St. George, Bloomsbury. Mr. G. Wallace, surveyor:—

Riches	£467 0 0
White	438 0 0
Ward	436 0 0
Axford	411 0 0
Lucas	389 0 0
Fotheringham	383 0 0
Watson	379 0 0
Morris	371 0 0
Clarke	369 0 0
Scott	359 0 0
Eldridge	358 0 0
Nightingale	334 0 0
Cross	326 0 0
Killingback (accepted)	320 0 0

For additions to schools at St. Helen's-street, Chesterfield, for the Chesterfield School Board. Mr. C. W. Rollinson, architect:—

Powell	£1,453 0 0
Forrest	1,380 0 0
Fidler	1,305 0 0
Chadwick & Co.	1,234 0 0
Rollinson	1,234 0 0
Wright, Chesterfield (accepted)	1,197 0 0
Margereson	1,194 0 0

For additions to schools at Hipper-street, Chesterfield, for the Chesterfield School Board. Mr. C. W. Rollinson, architect:—

Powell	£1,541 0 0
Brailsford	1,445 0 0
Hoole	1,411 0 0
Chadwick & Co.	1,370 0 0
F. Glossop	1,350 0 0
Gough	1,314 0 0
Forrest	1,303 0 0
Fidler	1,290 0 0
Rollinson	1,267 0 0
Heathcote & Son	1,249 0 0
Margereson	1,237 0 0
Roe, Alfreton (accepted)	1,217 0 0

For offices in Throgmorton-avenue, City, for Mr. Chas. Sanderson. Mr. Fred. Chancellor, architect. Quantities prepared by Messrs. Curtis & Sons:—

Brown	£10,427 0 0
E. Conder	10,394 0 0
Morter	10,300 0 0
Holland & Hannen	9,794 0 0
Nightingale	9,787 0 0
Brass (accepted)	9,676 0 0

For rebuilding the Congregational Church, Limba Magna. Mr. John R. Chamberlain, architect. Quantities by Mr. Hoffman Wood:—

Taylor & Son	£2,930 0 0
Walker & Boyne	2,925 10 0
Alf. Ward & Sons	2,917 0 0
Johnson & White	2,905 0 0
Thornton & Hill*	2,137 0 0

* An error of 800*l.* has been committed in making tender, and Messrs. Thornton & Hill decline to abide by their tender.

For repairs and re-decoration of Clapton Park Chapel, High-road, Lower Clapton.
Barber, Sons, & Lutwyche (accepted).

For alterations to shops in Spa-road and Jamaica-road Mr. H. J. Hansom, architect:—

Stephens	£587 0 0

For building a mortuary and disinfecting oven, except ironwork, at Walthamstow. Mr. George B. Jerram, C.E., surveyor:—

Fuller, Walthamstow	£139 0 0
Probert, Walthamstow	125 0 0
Barton, Walthamstow	98 0 0
Good, Walthamstow (accepted)	90 0 0

For sewers, Walthamstow. Mr. George B. Jerram, engineer. Quantities by Messrs. Hovenden, Heath, & Berridge:—

Contract No. 11.

	12-in. Pipes.*
Stubbs	£1,348 0 0 ..... £73 0 0
T. Adams	1,338 9 9 ..... 80 3 6
J. Simmons	1,272 6 10 ..... 68 4 6
Porter	1,216 8 11 ..... 39 10 0
Rutty	1,211 2 6 ..... 60 0 2
Wilkes & Co.	1,276 10 1 ..... 34 11 3
Hunter	1,066 11 3 ..... 38 17 0
Botterill	1,093 0 0 ..... 48 0 0
Acock	1,089 17 0 ..... 38 16 0
McKenzie	1,004 0 0 ..... 48 0 0
Neave	1,030 5 4 ..... 20 9 0
J. Bloomfield	1,000 0 0 ..... 54 0 0
L. Bell	1,007 0 0 ..... 43 11 3
Dewitt	943 0 0 ..... 42 18 9
Good	976 10 6 ..... 48 16 6
Stevenson	918 0 0 ..... 37 0 0
Ford & Everitt	869 0 0 ..... 50 0 0
Palmer	899 2 0 ..... 37 6 11
Currall & Co.†	849 16 6 ..... 36 16 5
Reeves	1,479 2 11½ 23 7 2
Jesse Jackson	1,222 0 0 ..... 58 0 0
Stracham	940 11 4 ..... 56 1 3

* Deduct if 12-in. pipes are used instead of 15-in.
† Accepted subject to usual conditions.

	Contract No. 12.	Contract No. 13.
Stubbs	£5,876 0 0	£4,372 0 0
T. Adams	5,256 18 2½	3,964 19 8½
J. Simmons	5,191 18 2	3,928 8 3
Porter	5,364 14 3½	3,584 10 5
Rutty	5,052 6 4	3,919 7 4
Wilkes & Co.	4,958 10 5	3,696 1 11
Hunter	4,548 1 0	3,486 6 4
Botterill	4,625 0 0	3,376 0 0
Acock	4,338 8 3	3,340 14 10
McKenzie	4,378 0 0	3,067 0 0
Neave	4,074 2 10	3,227 11 11
J. Bloomfield	4,238 0 0	3,100 0 0
L. Bell	4,124 0 0	3,098 16 3
Dewitt	4,072 0 0	3,185 0 0
Good	4,251 16 0	2,979 10 0
Stevenson	3,695 0 0	2,697 0 0
Ford & Everitt	3,808 0 0	2,655 0 0
Palmer	3,547 19 9*	2,655 5 9
Currall & Co.	3,525 0 0	2,595 10 0*

* Accepted subject to usual conditions.

For alterations and repairs at the Shernhall-street Schools, for the Walthamstow School Board. Mr. W. A. Longmore, architect Quantities supplied:—

J. J. Scott	£1,446 0 0
Good	1,381 11 3
Jullier & Co.	1,196 0 0
Lusk	1,195 0 0
Bentley	1,142 0 0
Cross	1,136 0 0
Read	1,080 0 0
Palmer	1,050 0 0

For the erection of four houses, Robert-street, North Woolwich. Mr. C. A. Legg, architect. Quantities supplied:—

Wood & Heap	£1,580 0 0
J. Parish	1,377 0 0
G. Lusk	1,300 0 0
A. Judd	1,232 0 0
Roper & Hawker	1,175 0 0
Banner	1,027 13 0

For additions to Messrs. Barker's premises, High-street, Kensington. Mr. Josiah Houle, architect:—

Bowles (accepted)	£5,721 0 0

For pulling down and re-building Nos. 48 and 49, Tabernacle-walk, Finsbury, for Mr. W. Waller. Messrs. Borer & Dobb, architects. No quantities:—

Allen	£2,150 0 0
Johnson	1,993 0 0
Sabey	1,929 0 0
Staines & Son	1,782 0 0

For alterations and additions, Western-road, Brighton for Messrs. Chipperfield & Butler. Messrs. Lainson & Son, architects:—

Nash & Co.	£2,937 0 0
Lockyer	2,932 0 0
Cheeseman & Co.	2,880 0 0
Garrett Bros.	2,527 0 0
J. Barnes (accepted)	2,474 0 0

For completion of works at Brighton New Club. Messrs Lainson & Son, architects:—

Cheeseman & Co. (accepted)	£4,278 0 0

For repairing and painting works at No. 101, Newgate-street. Mr. H. S. Legg, architect:—

Hayward & Son	£140 0 0
Geo. Shaw	136 10 0
Pitman & Son	130 0 0
Pitcher & Co. (accepted)	112 0 0

For repairs to schools and almshouses, Schoolhouse lane, Ratcliffe, for the Coopers' Company. Mr. G. Barnes Williams, architect:—

Little	£1,195 0 0
Ashby & Horner	820 0 0
Cook Bros.	785 0 0
Wood	725 0 0
Johnson	693 0 0

For the erection of a villa residence in Willesden-lane, Brondesbury, for Mr. John Winckworth. Mr. H. H. Bridgman, architect. Quantities by Mr. F. Thomson:—
H. Haynes, Alperton (accepted).

For rebuilding the boundary-wall of South Grove House, abutting on the Highgate Cemetery, for the Baroness Burdett-Coutts. Mr. H. H. Bridgman, architect:—
Southcott & Co. (accepted).

For a new drinking-fountain at St. Stephen's Schools, Westminster, for the Baroness Burdett-Coutts. Mr. H. H. Bridgman, architect:—
A. Bradford, Kennington (accepted).

For repairs and alterations to cottages on the Waterdell Estate, Watford, for the Rev. W. D. Morrice. Messrs. Sedgwick, Son, & Weall, architects:—

Turner, Watford	£635	0	0
Neal, Watford	609	0	0
Waterman, Watford	558	0	0
Miskin, St. Alban's (accepted)	547	0	0

For new stables and open sheds, &c., at Moor Pasture, Great Wratting, Suffolk, for the Right Hon. W. H. Smith, M.P. Messrs. Sedgwick, Son, & Weall, architects:—

Mason & Son, Haverhill (accepted)	£543	0	0

For new cottage, stables, &c., at Waterdell Farm, Watford, for the Rev. W. D. Morrice. Messrs. Sedgwick, Son, & Weall, architects:—

Miskin, St. Alban's	£845	0	0
Turner, Watford (accepted)	815	0	0

For repairs to Manor Farm House, Ruislip, Middlesex, for the Provost and Scholars of King's College, Cambridge. Messrs. Sedgwick, Son, & Weall, architects:—

Brown, Harefield (accepted)	£138	0	0

For repairs to farm buildings at Waterdell Farm, Watford, for the Rev. W. D. Morrice. Messrs. Sedgwick, Son, & Weall, architects:—

Neal, Watford	£420	0	0
Southcott, Highgate	377	0	0
Chadwick, Watford	343	0	0
Miskin, St. Alban's	280	0	0
Turner, Watford (accepted)	280	0	0

For new buildings at the Old Malting-yard, Great Wratting, Suffolk, for the Right Hon. W. H. Smith, M.P. Messrs. Sedgwick, Son, & Weall, architects:—

Cadge, Hartest	£543	11	0
Mason & Son, Haverhill (accepted)	497	10	0

For new house at Waterdell Farm, Watford, for the Rev. W. D. Morrice. Messrs. Sedgwick, Son, & Weall, architects:—

Miskin, St. Alban's	£1,278	0	0
Waterman, Watford	1,228	0	0
Neal, Watford	1,115	0	0
Turner, Watford (accepted)	1,097	0	0

For various works at Sowley Green and Wadgells and Harlica Farms, Great Thurlow, Suffolk, for the Right Hon. W. H. Smith, M.P. Messrs. Sedgwick, Son, & Weall, architects:—

Mason & Son, Haverhill (accepted)	£140	10	0

For new farm buildings at the Wood Farm, Gaddesden, Herts, for Mr. T. F. Halsey, M.P. Messrs. Sedgwick, Son, & Weall, architects:—

	If Roofs Tiled.	If Roofs Slated.
Cook Bros., Berkhamsted	£1,330	Deduct £35
J. Sear, Hemel Hempstead	1,125	Add 10s. per square.
C. Miskin, St. Alban's	1,120	Deduct £100
T. Turner, Watford*	997	Deduct £70

* Accepted.

For house, South Audley-street, for Mr. Nicholson, M.P. Mr. Crickmay, architect, Quantities by Messrs. Nixon & Raven:—

McLachlan & Sons (accepted).

Accepted for altering the Mitre Inn, Wakefield. Mr. William Watson, architect:—

Excavating, Brick, and Stone Work.

Flower Bros.	£160	0	0

Carpenters' and Joiners' Work.

Craven & Lloyd	97	9	0

Plumbing, Glazing, and Ironwork.

S. & P. Drake	79	4	0

Plastering Work.

T. C. Tattersall	18	19	4

Accepted for enlarging the Infirmary at the Union Workhouse, Wakefield. Mr. William Watson, architect:—

Excavating, Brick, and Stone Work.

Bagnall Bros.	£460	0	0

Slating Work.

C. F. Rycroft	46	10	0

Plastering Work.

Chas. Driver	44	0	0

Plumbing, Glazing, Ironwork, and Gasfitting.

Wm. Thresh	360	10	0

Carpenters' and Joiners' Work.

J. & J. Mountain	359	10	0

Painting Work.

George Powell	26	10	0

For rebuilding the Blue Posts Hotel, Cork-street, Bond-street, for Mr. Schlette. Mr. Tyler, architect. Quantities by Messrs. Stonor & Sons:—

Brass	£10,293	0	0
Conder	9,900	0	0
Ashby Bros.	9,849	0	0
Simpson	9,660	0	0
Bywaters	9,465	0	0
McLachlan & Sons	9,340	0	0

For new villa residences at Shoot-up-hill, Kilburn, for Mr. Deighton. Mr. Douns, architect. Quantities by Messrs. Widnell & Trollope:—

Perry & Co.	£8,540	0	0
Yerbey & Duncan	8,537	0	0
McLachlan & Sons	8,494	0	0
Patman & Fotheringham	8,473	0	0
Wall Bros.	8,472	0	0
Mark Manley	8,277	0	0
King	7,995	0	0
Scrivener & Co.	7,913	0	0
McCowan	7,440	0	0

For 363 yards of 20-inch by 16-inch egg-shaped outfall sewer and filter-bed, at Spital, near Chesterfield, for the Chesterfield Rural Sanitary Authority. Mr. R. Butterworth, surveyor:—

Robert Holmes, Shirland	£360	0	0
Bunting & Littlewood, Eckington	348	4	6
Joseph Cropper, Brimington	324	0	0
Froggatt, Newbold	312	15	0
Breedon & Spencer, Wessington	300	0	0
French & Shepherd, Apperknowle	299	10	0
Marsden & Clark, Sheepbridge	281	11	3
Rodgers & Wingad, Whittington*	281	0	0

* Accepted.

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